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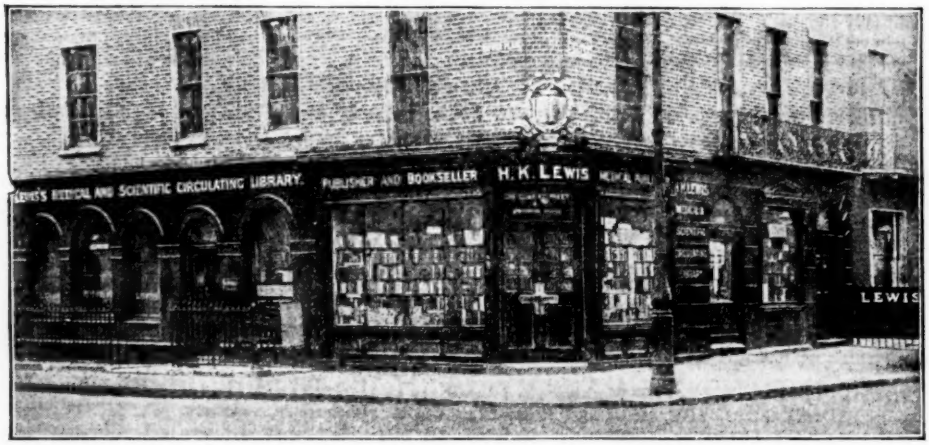

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The Treatment OF GUNSHOT WOUNDS OF THE JOINTS.

BY J. CAMPBELL, M.D. LIVERP.,

CAPTAIN, R.A.M.C. (S.R.); LATE SURGICAL REGISTRAR, ROYAL INFIRMARY, LIVERPOOL; SENIOR ASSISTANT TO THE PROFESSOR OF ANATOMY, ROYAL COLLEGE OF SURGEONS IN IRELAND, ETC.

PART I.

GUNSHOT wounds involving joints form something like 4 per cent. of the total number of wounds met with in the present war. They are of first-rate importance owing to the frequency with which they are followed by loss of life or limb or, short of these, by ankylosis, complete or incomplete, with a corresponding degree of incapacity to the individual.

This paper is founded on an experience of over 800 cases and on operative and post-operative treatment carried out in casualty clearing stations and general hospitals. Amongst those treated in the latter, separate series of cases involving the various joints were isolated and collected and not discharged to England till either completely healed or sufficiently far advanced in the process of healing to place them beyond any likelihood of subsequent interference, and this was verified by tracing the later history of all such cases to their termination in England. In a fair percentage of the remaining cases the end results were obtained by information gained from England. In this way I venture to think that some definite conclusions can be drawn as to the merits of the various methods of treatment and as to those most worthy of adoption.

CHARACTERISTICS OF JOINTS.

Synovial membrane.—Most joints are lined by synovial membrane. This possesses, in common with other serous membranes, two important characteristics on which all successful treatment is based—namely, (1) an extraordinarily strong capacity for overcoming septic infection; and (2) an equally strong capacity for forming adhesions. These adhesions form with considerable readiness; at the end of 24 hours they are very well marked indeed; sometimes they may form within several hours. As a result of this capacity for forming adhesions the advent of sepsis from without is largely prevented, and any sepsis inside the joint remains localised for a considerable time, granted that the exudation poured out has a free exit. It is largely in consequence of these two characteristics that joint lesions are now regarded as of much less surgical importance than was thought to be the case several years ago, granted that the wound is efficiently treated within a reasonable time of its infliction.

Articular cartilage.—Articular cartilage depends for its existence upon lymph. Anything, therefore, which interferes with its normal supply will assist in causing its death. Intact cartilage presents a definite resistance to infection and does not readily undergo erosion in the presence of sepsis, if it is not at the same time the subject of pressure. On the other hand, if it is the subject of pressure it does rapidly undergo erosion at the site of pressure. This is an important consideration in treatment and shows the necessity for maintaining constant extension in the axis of the limb so as to minimise or abolish the pressure of opposed cartilaginous surfaces on one another. Granted this is efficiently maintained, erosion can be largely avoided or its onset delayed in the presence of low or even moderate degrees of sepsis.

This influence of pressure on erosion was very vividly impressed on me in a case of low grade infection of the knee-joint resulting from secondary spread from a foreign body in the immediate neighbourhood. The case came under my care somewhat late (about two and a half to three weeks after the onset of the arthritis) and at the time was not making satisfactory progress; there was a definite degree of outward flexion causing deformity; extension had been more or less satisfactorily maintained on a Thomas's knee-splint. Radiographs taken at the time showed considerable erosion and loss of outline of the cartilage over the external condyles of femur and tibia, with no observable change over the internal ones.

The differences between the two sides of the joint were so striking as to induce one to make inquiries as to the details of the previous treatment. It transpired that it had been the custom to turn the patient over on to his normal side when changing the dressings and attending to the skin over his back. As a result the limb tended to sag inwards during the process owing to stretching of the joint capsule and ligaments from inflammatory softening which always accompanies an arthritis; consequently, the external condylar surfaces were jammed together and the internal ones separated, producing the condition described above.

The onset of erosion is frequently associated with "night starts." When these make their appearance it is a sure index of imperfect extension, and they disappear immediately the extension is tightened up and made adequate.

Arrangement of the blood-supply.—Another point of the greatest importance is the arrangement of the blood-supply to the articular ends of the bones; and as these are covered by avascular cartilage it follows that in gunshot wounds large masses of bone may readily be completely cut off from their vascular supply. Especially is this the case with the head of the femur when the wound involves the intracapsular portion of the neck of the bone. The same applies, only to a less extent, in the case of the head of the humerus and in varying degrees to the ends of other bones. These masses of loose bone form a suitable nidus for the growth of any organisms that have found their way into the wound, and are then often the site of origin of an acute arthritis.

Structure of the articular ends of bones.—The epiphyses and adjacent parts of the shaft are formed of cancellous tissue. Like other tissues—e.g., muscle, this suffers contusion, and then becomes just as liable to septic invasion with its attendant dangers. Contused cancellous tissue, then, must play a large part in producing septic arthritis in many cases.

GENERAL CONSIDERATIONS GOVERNING TREATMENT.

The general factors governing treatment cover a wide range and involve considerations of: (1) the patient; (2) the surgeon; (3) surrounding conditions generally; (4) nature of wound; (5) time elapsed after being wounded; (6) nature of infecting organism; and (7) radiography.

The Patient.

As regards the patient himself, the following should be taken into consideration:—

Age.—The younger the patient the more readily is he able to withstand conservative measures.

General condition.—The better this is, the more does the above suggestion apply. It is well when resorting to conservative measures in cases involving the larger joints, especially the knee and hip, to keep a close eye on the patient's general condition, for sometimes the local condition may appear to be making satisfactory progress, yet the patient is slowly going downhill and the pulse beginning to lose its volume. When this event occurs the time has passed for persistence in conservative measures, and the limb must be sacrificed.

Multiple wounds.—The more wounds a patient has, the less should be the degree of effort in the line of conservatism. For instance, if a patient is injured in such a way that the upper and lower limbs are both in jeopardy, unless there is reasonable certainty of saving both it is better to save the upper at the expense of the lower, sacrificing the leg at the outset rather than lose both arm and leg and, maybe, the life of the patient later on.

Occupation.—It is well to ascertain this at the outset, first, because in certain work a rigidly stiff limb is less useful to some patients than an artificial one; and, secondly, because it gives guidance as to the best position in which ankylosis should be secured, if such is likely to ensue—e.g., a farm labourer should have the elbow ankylosed at an angle of 135° to allow of the lifting of heavy weights; a professional man at an angle of 100°, to allow of writing and of access to the pockets. The same applies to the shoulder: the heavier the work done the less should the arm be abducted from the side (but in no case less than 40°), and the lighter the work done and the more mobility required for the arm the nearer an abduction of 90° should be secured. Other injuries will also largely affect the position for ankylosis—e.g., if the other hand be lost, then the remaining arm must be secured so that the patient can feed himself—that is to say, in complete flexion with semi-pronation of the forearm.

The Surgeon.

In serious cases treatment largely depends on the surgeon himself. If his skill and experience are large he naturally has the right to attempt greater degrees of conservatism than if his experience is small. His speed in operation and the amount of time he has at his disposal to give to after-treatment are also important. In doubtful cases nothing is more to be regretted than division of responsibility for treatment during the time when risk to life or limb is present.

Surrounding General Conditions.

During times of stress it is only natural that less conservative treatment should be adopted than during quiet periods on account of the lack of time at the disposal of everyone generally to attend to after-treatment, and also on account of the urgency of many other cases awaiting operation, for conservative measures take up considerably more time than more radical ones.

Nature of the Wound.

This is a matter of first-rate importance and involves consideration of: (*a*) size of aperture of entry or exit or both; (*b*) nature of the missile; (*c*) extent of the bone injury.

(*a*) *Size of entry or exit or both.*—The size of these apertures largely determines the treatment required—e.g., leech-bite entry and exit are usually not followed by sepsis, even when accompanied by severe fracture. Large wounds, on the other hand, even with little if any bone injury, are vastly more important in that their size varies directly with the amount of septic material that was introduced into the joint by the missile, and also with the amount of sepsis that has subsequently invaded it from without. Large external wounds, however, that communicate freely with the synovial cavity and thereby allow of the free exit of fluid from it, are appreciably less dangerous than similar wounds with valve-like openings which do not allow of this escape. With the former type I have frequently seen but little bad result in knee-joints, but with the latter very frequently serious consequences. In the one case the sepsis became localised by synovial adhesions; in the other it was soon disseminated over the entire joint surface by exudate. Unoperated cases demonstrating these differences in results were frequently to be seen in the general hospitals in 1915 and 1916.

(*b*) *The nature of the missile* largely determines the urgency or otherwise of the case; shell wounds are much more dangerous than those caused by undistorted rifle or machine-gun bullet. Indeed, early in the war it was comparatively uncommon in the base hospitals to see bad after-results accrue from the latter, granted that the ingress of sepsis from without was prevented, even in the case of quite large exit wounds. Where, however, the entry wound was large the cases had almost equally as much sepsis along their track and were equally as dangerous as shell wounds.

The size of the missile has an important bearing on the liability to sepsis and the urgency or otherwise of the necessity for intervention. It can be laid down as a working rule of practical importance for use in times of stress that missiles up to the size of a small pea usually give but little trouble; hence if such cannot be operated on within 48-60 hours, they are usually best left alone until all danger of lighting up sepsis by operation has passed. It follows, too, that these may, with a fair degree of safety, be allowed to pass straight to the base, after being efficiently immobilised.

Retained foreign bodies.—The relation of these to radiography will be discussed later on. There is no doubt that the sooner they are removed the less is the risk to the patient. The most satisfactory treatment is to excise the wound if possible *en masse*, together with the foreign body, at as early a time as possible; the joint is then carefully washed out, and the wound closed in layers—the synovial membrane by a continuous fine catgut suture to ensure a watertight closure, the capsule, muscle, and fasciæ in their separate layers by interrupted sutures, and finally the skin by silkworm gut.

In the absence of adequate and efficient radiographic reports (and perhaps even with the aid of them) the wound may require to be excised in layers. Any damaged bone surface is then carefully gouged or chiselled away *en masse*, and the joint cavity irrigated as before. The damaged surface of bone is then very lightly smeared with B.I.P. paste, and the joint closed as before.

It is surprising how long the effusion into a joint will remain sterile in cases where the foreign body is retained, especially if the limb is immobilised. In the case of the knee-joint, as late as the second, or even the third, day, I have on a number of occasions found the fluid sterile on cultivation with quite a large shell fragment *in situ*, even with fragments of clothing adherent to it—yet the foreign body readily yielded heavy cultures.

(*c*) *Extent of bone injury.*—This is a factor of paramount importance in treatment, and assumes a rôle of increasing prominence the greater the time that has elapsed between the injury and the operation. If the case is one due to rifle or machine-gun bullet with small entry and exit, however much the extent of bone comminution, there is little doubt but that the case is best left alone, excising perhaps the wounds in the skin only. Whatever the missile, if the case is seen early and has ragged entry and exit wounds, and more especially if the missile be retained, primary suture after efficient excision of the wounds and removal of all loose bone is the best line of treatment to adopt if it be feasible. Short of this, only two courses are left open as a primary measure—excision of the joint and amputation. Which of these should be adopted depends on the ability or not of being able to retain the case in hospital after operation and the patient's general condition. In certain cases the danger of accompanying fracture can be largely, if not completely, abolished by isolating the bone lesion from the synovial cavity; this may be accomplished by suturing together opposed synovial surfaces round about the fracture or by transplanting flaps of the same. This can sometimes be accomplished with ease in the knee-joint.

A serious and difficult problem that confronts the surgeon when operating on these cases is the amount of bone that should be removed.

It has been mentioned above that the cancellous tissue near a joint is very liable to contusion with its resultant dangers, particularly sepsis. Indeed, in the general hospitals it used to be quite common to see necrotic patches of this cancellous tissue on the cut surface of any bone in excised joints and in other cases also. This was largely due to the fact that sufficient of the contused tissue had not been removed.

It is advisable in these cases to make a point of removing contused tissue till definitely oozing bone is exposed with the chisel. This does not necessitate removal of all the contused bone any more than, in the case of muscle wounds, all contused muscle should be excised; otherwise far too much tissue would be unnecessarily sacrificed. If this hopelessly damaged bone is not removed any organisms remaining behind are liable to produce not only local sepsis with its serious consequences, but even a fulminating osteomyelitis. This last complication was not infrequently seen at the base in the earlier part of the war, when so many cases arrived there without any operation having been previously performed. Its presence is suggested by the patient's serious general condition and by tenderness, possibly with thickening along the entire length of the bone. On amputation its presence can usually be readily recognised in the marrow.

If the case has become septic before the operation is resorted to, more radical methods must be used varying, according to the joint involved, from drainage (e.g., elbow) to excision (e.g., hip, shoulder) or even amputation.

Fractures secondarily involving a joint.—Such cases treated early—i.e., within six to eight hours or even longer—usually yield satisfactory results if the wound and fracture are treated locally and the crack left severely alone. Should the joint be distended with bloody effusion it is well to empty it and then apply a firm bandage to prevent its recurrence. Later on, when sepsis may have spread along the entire extent of the fracture, a certain number settle down readily, granted that the fracture is well drained and carefully immobilised. But unfortunately the joint has often to be drained as well, or even the limb sacrificed in the case of the larger articulations.

Time Elapsed after Receipt of Wound.

This must be ascertained at the outset, before operation, as it is of more importance in some respects, in the case of joint wounds, than in the case of other wounds of the extremities. On it depends, in a way, the type of operation that must be done. Roughly speaking, there are two types of cases—those under 24 and those over 36 to 48 hours old. This division is entirely arbitrary; the intermediate cases cannot be readily classified, but must be treated on their merits according as they appear to belong to the first or second group.

Cases over 36 or 48 hours old are best left alone if progressing not unsatisfactorily after having the skin in the neighbourhood carefully cleaned and sterilised and the joint immobilised, this being aided by fixed extension in the straight position. With regard to cases that have been mounted in flexion after being hit, it is well to remember that the advantages to be gained by fixed extension may be outbalanced by the consequences of moving a joint that is settling down. Such movement may break down the synovial adhesions which form the only existing barrier that prevents external sepsis from invading the joint.

Cases under 24 hours old are, as a whole, best operated on immediately and the wounds closed. In a number of cases with marked damage to the neighbouring tissues or in which the wound cannot be excised perfectly, it is advisable to close only the joint cavity and capsule. The rest of the wound is left widely open but with loose sutures placed *in situ* ready to be tightened up later on. The wound is then well packed with paraffin gauze, tightly bandaged, and left undressed for 2-4 days, when, granted it is sufficiently clean bacteriologically, the wound is closed by tightening the stitches. Should the condition be not then satisfactory, it is advantageous to apply the Carrel-Dakin method of treatment if this has not already been used from the outset.

Nature of the Infecting Organism.

As elsewhere, different organisms and different strains of the same organism produce widely different effects and in later cases treatment may depend on their recognition. Those most frequently encountered and clinically the most important are: (*a*) The bacilli of gas gangrene; (*b*) staphylococcus; (*c*) streptococcus. Of these the most dangerous to life and limb is the *streptococcus*, but even here the strain is largely the governing factor—e.g., a highly hæmolytic one infecting the knee-joint gives rise to a fulminating septicæmia, fatal within a few hours; on the other hand, quite a large number infected with other strains readily settle down.

As regards infection with *staphylococcus*, most cases get well if carefully immobilised, the source of infection, if

possible, removed, and cross infection from without prevented. Nearly all more serious staphylococcic cases that do not respond to the above treatment settle down after efficient and suitable arthrotomy followed by drainage.

B. perfringens, when invading a joint cavity, has a strong tendency to disappear; but it is, unfortunately, almost invariably accompanied by either one or both of the above organisms. It is these others that assume the major importance in treatment. In this connexion one should mention that the presence of gas in a joint does not necessarily indicate *B. perfringens* infection; it is sometimes due to certain strains of streptococci.

Estimation of the degree of infection.—This is by no means an easy matter to decide and requires a large clinical experience to enable one to draw reliable conclusions, and even then errors are not rare—i.e., granted that efficient conservative measures are adopted. Clinically, the degree of sepsis is best estimated by the pulse-rate and general appearance rather than by the temperature. It has been my custom not to worry about any case in which the pulse-rate has been below 100, whatever the temperature might be. A high pulse rate, more especially when associated with a rising temperature, and still more so with a dry tongue, is of serious omen. But even in these cases it is well to proceed to a bacteriological examination of the joint contents before resorting to drastic measures, because occasionally in such cases one is unable to obtain cultures of organisms and the case settles down on being left severely alone. Some complication perhaps is the cause of the condition.

Besides the above, other methods of estimating the degree of infection should be followed out—namely: (*a*) cytological, and (*b*) cultural.

The cytological examination of the exudate yields information in regard to the nature, number, relative proportion, and staining characteristics of the cells present. A relative increase in the number of organisms to leucocytes suggests unsatisfactory progress, and the converse holds equally true.

Nature of the cells.—An exudate showing a high proportion of mononucleated, and more especially eosinophile cells, indicates a mild degree of infection as compared with one in which they are few or absent.

Number.—The fewer the leucocytes and the more the organisms, the more dangerous is the infection as a rule, and vice versa.

Staining characteristics.—Cells staining badly and showing much disintegration indicate either (*a*) cytolysis due to toxins, or (*b*) senile degeneration. The general appearance of the cells and the high proportion of lymphocytes and eosinophiles present in effusions of some duration readily allow of differentiation of the two types.

The cultural characteristics of the organisms are of value, especially in the case of the streptococci as demonstrated by the degree of hæmolysis they may produce; the higher the hæmolytic power the graver is the infection. Infection of the knee- or hip-joints with strongly hæmolytic streptococci is remarkably and rapidly fatal, usually from a fulminating septicæmia.

Notwithstanding, however, the value of these laboratory findings, one must always bear in mind the general condition of the patient.

If the patient is slowly going downhill, some modification of the treatment is required. In doubtful cases nothing gives a better idea of a patient's condition than his general appearance and the changes it undergoes. These changes are not readily appreciated by one in constant attendance on the patient, but are painfully obvious to anyone seeing him at intervals (2–4 days, for example). Indeed, in such cases an outside opinion on this point every 2–4 days is a useful and necessary adjunct to treatment, and may be the means of avoiding some unfortunate results.

In this connexion there is one source of error which, unless it is appreciated, is fraught with serious consequences: when the septic exudate, after being under high tension for a time, bursts through the capsule, there is an appreciable improvement in the general condition, the pain locally is less, and the temperature and pulse-rates fall appreciably, due to diminished toxin absorption from lowered tension. But this improvement is only temporary; at the end of 2–3 days the patient's condition is as bad as, if not worse than, before. The bursting of the infection through the capsule is readily seen by the local increase in swelling, not confined to the limits of the synovial cavity. Such a condition calls for immediate interference, otherwise extensive tracking along fascial planes may occur, with its attendant dangers.

Radiography.

The value of efficient radiographic examinations in joint cases cannot be over-estimated. To be adequate it entails: (*a*) Localisation of any foreign body present by marks on both surfaces of the limb in two planes at right angles to one another, and (*b*) good radiographs, taken by preference in two planes as before. In each instance the most suitable planes for use are the anatomical antero-posterior and transverse ones. I think that such an examination yields more information and is of vastly greater value than one made by stereoscopic plates alone.

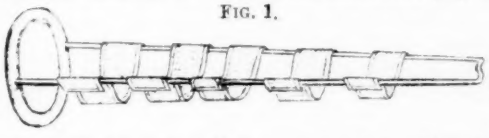
Granted that the examination has been carried out as described, an accurate estimation of the site of any foreign body and the extent of bone damage can be readily made; and in consequence the nature and site of operation can be planned from the outset, so as to allow of excision of the wound in an efficient manner—perhaps in one piece, inclusive of the foreign body.

FUNDAMENTAL PRINCIPLES UNDERLYING TREATMENT AND OPERATIVE TECHNIQUE.

Absolute Rest and Fixation.

Absolute rest and fixation are the essential principles underlying the successful treatment of all joint wounds in their early stages, and their value cannot be overestimated. Cases have frequently been sent under my care which appeared to be doing unsatisfactorily, but which completely settled down after securing adequate rest and fixation combined with efficient extension, and I am quite convinced that a large number of such cases escaped serious surgical interference and even amputation merely by securing these fundamentals. The best method for securing them, whether for transport or treatment, is by fixed axial extension of the limb in one of Thomas's or Jones's splints, the limbs being supported in it by bands of perforated zinc, the ends of which are turned round the lateral bars (Fig. 1);

FIG. 1.



finally, the limb is well padded, covered with Gooch's splinting, and secured in the splint by a firm bandage. *To ensure an absence of movement during dressings it is essential for as few as possible of the metal supports to be removed, and then only with the greatest care. No movement, however slight, should be permitted.* On not a few occasions have I seen limbs and even lives jeopardised by careless movement of a large joint during a dressing.

In this connexion the use of strips of flannel or cotton bandage to support the limb cannot be too strongly condemned; they are not rigid, and so permit of an appreciable amount of movement in bed and during transport—sufficient to vitiate the result in many of the more serious cases.

The need for rest and fixation by no means begins in the C.C.S.; it is essential for them to be secured at the time the patient is wounded or at the next earliest moment possible. Since splints—more especially the Thomas for knee cases—have been used systematically at the regimental aid-post or field ambulance the results obtained in wounds of the joints have considerably improved. But even yet it is surprising how many cases escape having splints applied before reaching a C.C.S., and still more surprising how common it is to see the Thomas's knee-splint imperfectly applied.

In one's own experience fully 40–50 per cent. reach the C.C.S. with the extension bands quite slack; this is nearly always due to the bands being tightened before the ring of the splint has been pushed home against the ischial tuberosity; in such a case, seemingly adequate extension has been applied at the time of splinting, but the point of counter extension has really been the fleshy fold of the buttock assisted by the weight of the patient, and not the non-yielding tuberosity of the ischium. To avoid this, it is essential during the application of the splint to pull down through the ring this fleshy mass—otherwise the splint cannot rest against the bony point.

Another cause of imperfect extension is the use of a Thomas's splint with a ring that is either too large or too thickly padded—though when applied it may rest against the bone, it slides inwards on to the perineum with the slightest movement, and so extension is lost. This defect may generally be surmounted by placing a *large, firm* pad between the outer part of the ring and the hip; thereby any inward displacement is prevented.

A similar criticism applies to the use of a Thomas's arm-splint fitted with a swivel attachment—it certainly does permit of easier transport by allowing adduction of the limb, but only at the expense of loss of extension and fixation.

Plaster-of-Paris is sometimes used instead of splints to secure fixation—in late stages of convalescence it is useful to allow of the patient getting about. But in early septic cases its use is attended with many disadvantages. Chiefest of all is the impossibility of preventing the plaster from becoming soiled with the septic discharge from the wound; this then forms a centre from which the wound is constantly reinfected. Another important disadvantage is that it does not allow of access to the adjacent parts of the limb, thereby preventing all possibility of massage and obscuring any changes in the neighbourhood of the joint.

Asepsis.

It is essential for this to be secured at the time of operation. There should be one or several changes of the instruments employed. After excision of the wound locally down

to, and inclusive of, the capsule it is advisable to begin again as for an entirely fresh operation. This should include covering up of the excised wound, re-sterilisation of the limb, and a fresh incision to open the joint in an entirely different situation. Asepsis, too, is just as important at each subsequent dressing and cannot be too strongly insisted on. In the writer's opinion, joint cases should in each unit be allocated as far as possible to special wards and tended by persons skilled in their treatment and in asepsis.

Dressings should be changed as infrequently as possible for two reasons: (1) the risk of movement, and (2) the risk of fresh infection from without. This latter is a consideration of prime importance where it has been impossible to close the joint cavity and sew up the wound. For these cases it seems best to use B.I.P. paste in preference to any other method of wound treatment, even the Carrel Dakin one. In the treatment of individual cases division of responsibility as regards dressings is to be deplored; the dressings should be undertaken by the same person on each occasion.

Massage and Movement.

To ensure a good range of movement it is advisable for massage and movement to be begun as early as possible in cases that have run an aseptic course—i.e., about the tenth to the twentieth day, according to the severity of the lesion. In those that have been septic even to only a moderate degree one has to realise that the most important considerations are, first, the overcoming of infection; and, second, the avoidance of a recrudescence, and nothing is more prone to cause the latter than too early movement. Such cases should have been free from all clinical signs of infection for at least three weeks or even longer, according to the degree of sepsis, before movement is resorted to. The appearance of effusion in the joint or of general or local reaction after movement is an indication for a pause in its application. The resumption of movement in joints where foreign bodies are retained is liable to be attended by trouble that may quite easily cost the patient his limb. Unless the foreign body is removed by operation, movement is best postponed for at least several months.

Use of the Tourniquet at Operations.

The application of a tourniquet to the limb prior to operation is essential if a uniformly high standard of results is to be obtained, for several reasons:—

1. The spread of sepsis by contaminated blood flowing over freshly cut aseptic surfaces is avoided.
2. The need for using many instruments is diminished.
3. The field of operation is not obscured by blood.
4. Ligatures need but rarely be used, and hence their action as foreign bodies is avoided.
5. All bleeding into the joint cavity is prevented, not only at the time of operation but subsequently, granted that the limb is very firmly bandaged and completely immobilised in the splint before the tourniquet is removed. I am quite sure that one cause of failure in a number of cases where the tourniquet is not used (especially knee and tarsal ones) is due to the extravasation of blood into the joint cavity after the bandage has been removed. The clot so formed provides a suitable nidus for organisms to multiply in and prevents opposed synovial surfaces from forming adhesions and thereby localising sepsis.

Washing Out of the Joint Cavity.

As a routine measure at a primary operation where the joint is laid open this appears useful.

From personal experience it is best carried out either with a solution in water of 2 per cent. di-chloramine-T and 2 per cent. neutral sodium oleate or with a mixture of hydrogen peroxide and Dakin's solution. At the same time flakes of fibrin and fragments of blood clot should be removed individually and with the greatest care by forceps. Each of the mixtures mentioned above is of benefit from its mechanical rather than its antiseptic action. When used for septic arthritis care should be taken that adhesions are not broken down by pressure; otherwise recesses that are locked off may have sepsis driven into them.

After drainage of the joint cavity it was the rule earlier in the campaign to wash out the joint at each dressing; the result of this was that adhesions were prevented from forming or were broken down whilst still feeble. In this way the joint cavity remained widely open and was only slowly obliterated. Meanwhile it was exposed to and not infrequently became the subject of cross infection with its increased dangers. There is no doubt that such irrigation is a frequent cause of failure, and should not be adopted. Its abandonment as a routine measure has enormously improved results, especially in knee cases.

Obliteration of Dead Space: Use of Paraffinised Gauze Packs.

Accumulations of blood are liable to occur in wound recesses after operation, and may then be the starting-point of septic infection—the blood acting as a dead tissue in which organisms left behind after operation can flourish. Every attempt, then, should be made when dealing with early wounds to prevent these accumulations by obliterating all "dead space" and yet allow of drainage of any exudate that may take place.

If primary suture is performed, this may be accomplished by careful hæmostasis, followed by the application of a very firm bandage. Should, however, the wound be unsuitable for primary suture or, with suture, still show a dead space, these objects can be gained by using as a pack gauze soaked in sterilised liquid paraffin; this is carefully and firmly pushed into every recess and the limb firmly bandaged. The pack exerts pressure, and so helps in hæmostasis, and the paraffin hinders coagulation of blood and serum, and so allows of their drainage along the gauze into the more superficial parts of the dressing. Such a pack may be left *in situ* for two to four days or longer, the superficial parts of the dressing being changed on the first or second day only if the "dressing has come through." When the pack is removed it may be replaced by paraffinised or dry gauze as required, unless the wound can be entirely closed.

The cases in which this treatment yields excellent results are those showing large loss of bone substance involving articular cartilage, and in which the synovial cavity cannot be closed for anatomical reasons. Such cases are universally acknowledged to be amongst the most difficult of all to treat satisfactorily. I always prefer to use the paraffinised gauze in conjunction with a small amount of B.I.P. paste.

Moist gauze when used to obliterate dead space does not yield anything like so good a result. It is inadvisable to use it after removal of a paraffin pack. I have been greatly impressed, particularly during the past ten months, by the readiness with which gunshot wounds, after excision, may be successfully sewn up by primary or delayed primary suture if all moisture is very carefully kept away from them. On the other hand, if moist gauze is used as a primary dressing or to replace any paraffinised pack, a much larger percentage of excised wounds either do not reach a condition suitable for such measures or if sutured break down. This is due to the moisture providing a suitable medium for the growth of organisms.

Herein, I think, lies another advantage to be gained by the use of paraffinised gauze. To sum up its chief advantages, one may say it allows of better drainage of the wound than can be obtained by the use of moist dressings without possessing their disadvantages. It does not furnish a moist medium in which organisms can flourish; it does not adhere to the surface of newly forming granulations, and on removal does not cause bleeding, as does dry gauze; thereby the risk of opening fresh paths for septic invasion is avoided.

Unless the wound has been excised *en masse* the use of fat grafts to obliterate dead space would seem to be not unattended by risk. Where, however, asepsis can be reasonably guaranteed they yield excellent results. Should any gap be left in an articular surface, one way of obliterating it that yields useful results is to fill it up with a 2 per cent. paste of di-chloramine-T in neutral sodium oleate or neutral sodium stearate before closing the joint. A mass of B.I.P. paste should not be used owing to the risk of bismuth poisoning arising shortly afterwards or from the danger of its acting as a foreign body and being extruded later on.

Secondary Operations.

In a base hospital these are not infrequently required for one reason or another. It is essential to carry them out without removing the splint. To attempt otherwise courts disaster from a recrudescence of septic arthritis with its attendant consequences. Careless manipulation or movement in septic infections affecting a large joint may rapidly sweep off a patient from a fulminating septicæmia.

OPERATIVE TREATMENT.

Besides the essentials in treatment described above certain other methods are used and may be discussed at once.

Aspiration.

This procedure is useful in doubtfully infected cases for the purpose of making bacteriological and cytological examinations of the joint fluid, but if carelessly performed the damage done to the articular cartilage and synovial lining may immeasurably outweigh the advantages gained. It is advisable to use it as rarely as possible in those cases that are but mildly septic; indeed, here it is scarcely necessary, since the ordinary clinical signs yield information of more practical value for treatment. It is necessary, however, when the intra-articular tension becomes high, otherwise the infection may burst outside the synovial cavity and perhaps track widely along the fascial planes.

Exploration and Washing Out of the Joint Cavity followed by Suture.

This procedure appears to have but a limited application. Indeed, the greater one's experience is in dealing with infected joints the less does one resort to this procedure, for two reasons: first, because such cases as seem suitable for the treatment almost invariably settle down if carefully

immobilised in the extended position and left severely alone, aided perhaps by aspiration; and, secondly, because in those cases where it is used further operative procedures have nearly always to be resorted to.

As regards the earlier cases in which this treatment was used and which seemed to derive benefit from it, looking back on them one cannot but be impressed by the fact that almost all would have made equally satisfactory, if not better, progress had they been left alone.

Should this procedure be adopted, free exit for the fluid should be permitted for fear lest any recesses in the joint cavity that are already locked off by adhesions should be opened up and have sepsis driven into them. All flakes of blood clot, fibrin, and pus should be carefully sought out and removed; finally, the limb is bandaged tightly to prevent exudation and allow of the rapid formation of adhesions.

Excision of the wound has already been discussed above.

The Use of B.I.P. Paste.

The value of Morison's B I.P. paste in wound treatment would appear to be completely established.

In regard to *early* joint cases it seems to have two valuable fields of use.

(*a*) In cases where a portion of the bone inside the joint has been chiselled away it is advisable to smear a small quantity over the freshly cut surface prior to closing the joint. Should a cavity of any sort remain in the bone connected with the joint it may be obliterated, as described above, with chloramine paste or a fat graft.

(*b*) In cases—e.g., the knee—where, after operation, a large gap that cannot be repaired is left in the joint coverings, accompanied by a more or less extensive loss of subjacent bone involving the articular surfaces, B I P. paste may be smeared over the entire wound surface after excision and the wound closed as far as possible in layers either at once or by delayed suture, after having carefully obliterated dead space with a paraffinised gauze pack. Secondary suture in such a case is a somewhat risky procedure unless all dead space is obliterated. If this cannot be done it is preferable to allow the wound edges to fall in and the wound to heal by granulation.

Use in the treatment of septic arthritis.—Here B.I.P. paste has been largely advocated and not infrequently adopted. The joint is widely opened up and cleaned out. B.I.P. is then distributed over the entire joint surface directly and indirectly by movement. Finally, the joint may be sewn up or left open. In quite a number of the cases where I have seen it used with apparent success I was struck by the fact that nearly all of the cases would almost certainly have settled down had they been left alone and efficiently immobilised. In but few cases was the pulse-rate higher than 100 when treated. B.I.P.P. used in this way inside a joint has a serious drawback: it may be ejected later on as a foreign body and so cause considerable trouble on resumption of movement.

The Use of the Carrel-Dakin Method.

In early cases, after efficient excision of the wound, this method only rarely need be adopted. There is no doubt that simple primary suture or delayed primary suture after using B.I.P.P. yields the better results.

On the other hand, when sepsis develops, in the large majority of cases the Carrel-Dakin method yields the better results. When a wound of any size leading into the joint cavity is more than 36 hours old and appears fairly clean it is well not to adopt any operative procedure, but rather merely to cover the wound with Carrel tubes and, if possible, perform a secondary suture as soon as the condition of the wound allows. The same treatment applies to more recent wounds that are very septic and require excision down to and inclusive of the capsule owing to risk of spread of infection into the interior of the joint. The presence of a retained foreign body may necessitate interference.

Carrel tubes may be inserted into the joint through the original wound, but not shortly after the injury. It is, however, a most useful procedure when it is found that definitely infected fluid is exuding from the joint cavity and it appears probable that the sepsis is localised to one part of the cavity. The tubes should have open ends and be inserted with the utmost care, otherwise adhesions localising the infection may be broken down. Not more than two or three should be inserted at a time even into such a large joint as the knee. They should be changed once every two days—not oftener. The tubes are no longer required when the joint cavity is obliterated save for the tracks occupied by them; these tracks may be obliterated by a firmly applied bandage.

Use after drainage of the joint by free incisions.—Drainage of the joint is the only method of saving the limb in a large percentage of the more septic cases. It is successful if suitably and efficiently carried out. It should, if possible, be combined with the insertion of Carrel tubes into the joint cavity, in a suitable way and in properly chosen situations. These tubes are removed as soon as adhesions have occluded the cavity—i.e., usually from the second to the fourth day; if left *in situ* more than two days they are changed every other day. In some joints, however, the tubes cannot be inserted, and simple arthrotomy yields excellent results—e.g., the elbow.

Excision of the Joint.

This procedure can be used for either early or late cases, and may be either partial or complete. As a rule the object to be aimed at is mobility in the upper limb, stability and bony union in the lower.

Early cases.—Here *complete excision* is best reserved for cases which cannot otherwise be sewn up as a primary measure, which have the end of one or both bones comminuted and which will ultimately yield a useful limb. It is the method of election in the lower limb, especially for the knee-joint, as here fibrous union is liable to yield a flail leg. *Incomplete excision*—i.e., of the end of one bone only or of part of one bone—is of most use in the upper limb and yields excellent results, as it is frequently followed by a fair range of movement. In both forms early or immediate closure is essential to avoid the risk of sepsis and fibrous union in the lower, and to allow of early movement in the upper limb.

Late cases.—Excision as a method of treatment for septic arthritis cannot be advocated as a sound or wise procedure as a general rule. The exposure of large surfaces of newly cut cancellous tissue to severe infection is a dangerous procedure, more particularly when, as so often happens, the infection in the bone has been already localised. In a number of instances I have seen more or less successful results, but these were nearly always in mildly septic cases and such as, I feel sure, would yet have yielded quite satisfactory results without any interference.

In the more severe cases amputation has sooner or later to be resorted to. At one time late excision was widely advocated by the French, but now has largely fallen into disrepute amongst them, and by many is severely condemned. In certain special cases, however, it must be used to save the life or limb of the patient—e.g., in the shoulder, hip, or ankle. In the shoulder and hip it is rendered necessary by the anatomical arrangement of the ends of the bones and of their blood-supply. In the ankle, if the astragalus is fractured to any extent and the joint becomes infected this bone is very liable to a septic osteitis and requires removal; excision of the bone, too, may be necessary merely to allow of efficient drainage of the joint.

When resorting to excision of a joint two methods may be employed according as we desire bony or fibrous union; they are respectively: (*a*) subperiosteal, and (*b*) non-subperiosteal (i.e., the periosteum is removed with the bone). The second method should only be used after the most careful consideration, as there is such a strong tendency for a flail joint to result, particularly if the wound has suppurated for some time. It is well to bear in mind that later on a plastic operation to allow of movement can in many cases be easily and successfully carried out.

Amputation.

This operation is reserved for:—

(*a*) Cases that are too ill to allow of conservative measures being adopted.

(*b*) Cases in which the comminution of bone is so extensive as to preclude the possibility of a successful end-result.

(*c*) Cases accompanied by severe lesions of the main nerves and muscles.

(*d*) Cases in the lower limb accompanied by serious damage to the main vessel and in which there is considerable risk of gangrene.

(*e*) Septic cases, where an extensive osteomyelitis of a large bone—e.g., femur or tibia—is also present.

(*To be continued.*)

SOME ASPECTS OF INFANT FEEDING.

BY J. C. DRUMMOND, D.Sc.

THERE are few problems of nutrition which arouse greater interest at the present time than those which relate to the feeding of infants. Our knowledge of the dietary requirements of the human organism has advanced so rapidly during the last decade that it has led to abandonment of many beliefs and the modification of many fundamental theories. Such a theory was that which taught us that the food requirements of the animal body could be expressed in terms of what had for so long been regarded as the primary food units—the proteins, fats, carbohydrates, and inorganic salts.

It is unnecessary to review here the large amount of research work which has demonstrated the inaccuracy of this theory, for it is now generally accepted that these food units are in themselves insufficient to satisfy the requirements of the animal for growth and maintenance of health, and that there exist a number of indispensable dietary components which are not members of any of these four recognised classes of foodstuffs.

Accessory Factors of the Diet.

It is mainly as a result of the pioneer work of Hopkins[1] in this country that research upon this subject has been stimulated so far that a stage has now been reached when we can almost claim to be able to define the fundamental dietary units. Animals fed upon a diet of pure protein, fat, carbohydrate, and inorganic salts rapidly decline in health and die within a comparatively short time unless they are provided with an adequate amount of certain other dietary factors. These substances received the name "vitamines" from Funk, but chiefly for the reason that this term is very misleading it is now being discarded. These substances are now referred to collectively as the accessory factors of the diet. So far the existence of three individual substances of this type has been detected. At least two of these are of primary importance for growth, whilst all three are undoubtedly necessary for the preservation of health.

The provisional and non-committal names which have been allotted to these factors are as follows: (1) Fat-soluble A"; (2) "Water-soluble B," or anti-beri-beri (anti-neuritic) factor; and (3) "Water-soluble C," or antiscorbutic factor. As yet practically nothing is known of the chemical nature of any one of these substances.

The object of the present paper is to draw attention to the influence of these factors on infant nutrition. Unfortunately, those interested in the science of infant feeding are only just beginning to appreciate the vital importance of these substances for growth, and one still encounters many misleading and inaccurate statements about them.

"Fat-soluble A" is synthesised by the plant and is found present in most green leaves and in the embryos of certain cereals. Such foodstuffs constitute the primary sources of the factor for the animal organism, which, apparently, does not possess the power to synthesise it. In the embryos of seeds this substance probably occurs in loose combination with protein, but when liberated, as it is during digestion, it shows similar solubilities to the fats and lipoids, and accompanies these substances during absorption. The growing animal demands a liberal supply of this factor, but we are ignorant as to the exact rôle it plays in the body. The adult can maintain good health upon a much smaller intake. Probably in both cases any excess of intake over and above the actual requirements for growth or tissue repair is stored in company with depôt fat. Young animals deprived of this factor in their diet usually show no ill effect for a little time, during which it is probable that they are drawing upon their reserve supplies to make good the deficiency. Sooner or later, however, growth ceases, and they exhibit a greatly impaired resistance to disease, which usually results in an early death from acute infections, particularly of the lungs. Prompt correction of the inadequacy in the diet by the inclusion of some foodstuff containing an ample amount of the missing factor results in a more or less rapid recovery of health, and ultimately the resumption of a normal rate of growth.

The "water-soluble B" is probably identical with the dietary factor that has been termed the anti-beri-beri vitamine.[2] The diseases known as beri-beri and infantile beri-beri represent, however, the final pathological condition induced by a deficiency of this factor in the diet. Long before such syndromes appear the deficiency manifests itself in a retardation or inhibition of growth. Young animals show absolutely no growth when entirely deprived of this dietary unit, and it is only after this inhibition has been maintained for some time that the typical symptoms of nerve incoördination appear. The animal cannot synthesise "water-soluble B," and is therefore entirely dependent upon the plant kingdom for its supplies. Cereal embryos and yeast are the richest known sources amongst the natural foodstuffs.

The antiscorbutic factor, or, as we may now term it, "water-soluble C," is probably indispensable to all growing animals, although many species exhibit a very slight susceptibility to scurvy, and therefore require very small amounts of the protecting substance. As in the case of the factors "A" and "B," the animal is primarily dependent upon the plant kingdom for the substance "C," which chiefly occurs in fresh vegetables and fruits.

The following tables indicate the chief properties of the three substances, and give a short guide as to their distribution in natural foodstuffs:—

TABLE I.

A = "Fat-soluble A." B = "Water-soluble B," or anti-beri-beri factor. C = "Water-soluble C," or anti-scorbutic factor.

—	A.	B.	C.
Stability to temperature.	Stable at 100° C., probably stable at 140° C.	Comparatively stable at 100° C. Slowly destroyed at 120° C. and above.	Gradually destroyed above 50° C. Rapidly destroyed above 80° C.
Stability to alkalies.	Stable in cold, possibly stable when hot.	Slowly destroyed in cold. Rapidly destroyed when hot.	Rapidly destroyed even when cold.
Stability to acids.	Probably stable.	Comparatively stable.	Comparatively stable below 50° C.

TABLE II.—*Distribution of Accessory Factors in Natural Foodstuffs.*

A = "Fat-soluble A." B = "Water-soluble B," or anti-beri-beri factor. C = "Water-soluble C," or antiscorbutic factor.

Foodstuff.	A	B	C	Foodstuff.	A	B	C
Milk	++	++	+	Wheat, whole grain	+	++	—
Butter	+++	—	—	Wheat, embryo	++	+++	—
Cream	++	+	+?	Wheat, endosperm ...	—	—	—
Separated milk	—	++	+	Wheat, bran	—	+	—
Whey	—	++	+?	Rice, polished	—	—	—
Egg yolk ...	+++	+	?	,, whole grain	+	++	—
,, white ...	—	+	?—	White bread...	—	—	—
Beef fat... ...	++	—	—	Wholemeal bread	+	++	—
Lard	—	—	—	Yeast, dried...	+?	+++	—
Vegetable oils	—	—	—	Yeast, extract (commercial)	—	+++	—
Animal fat, margarines	+	—	?—	Cabbage, fresh	++	+	+++
Vegetable oil, margarines	—	—	—	,, dried	++	+	—
Lean meat ...	—	—	+	Spinach ...	++	+	+++
Liver	++	++		Potatoes ...	—	+	++
Heart, kidneys	+	+		Oranges ...	—	—	+++
Pancreas ...	+	++		Tomatoes ...	?	+	?
Brain	+	++		Onions	?	—	+++
"Lean" fish—e.g., cod ...	—	+	+?	Apples (green)	?	—	+++
"Fat" fish—e.g., herring	+	+		Lettuces ...	+	—	+++
Fish roe ...	+	++		Peas, dry ...	?	+	—
Cod-liver oil	+++	—	—	,, fresh ...	+	+	+++
Fish-body oils	++	—	—	Malt extract	—	—	?

A rough attempt has been made to give some idea of the relative values of foodstuffs containing the factors by employing more than one positive sign. A negative sign indicates the absence of a factor, whilst an interrogation mark shows either a doubtful result or that no investigation has been made.

During the last few years I have carried out a large amount of experimental research on the influence of accessory substances upon the nutrition of young growing animals. For these experiments I have employed the rat, an animal which has many times been proved to be of the greatest value for such a purpose. The results I have obtained may have, I believe, in many cases an important bearing upon child nutrition, and for that reason I am putting forward certain suggestions, based upon practical

experience, which I trust will engage the attention of those who possess a wide knowledge of the practical side of infant feeding.

These experiments upon animals have demonstrated the absolute indispensability of an adequate supply of the accessory factors during the period of growth. Since there is a certain amount of evidence in favour of the view that these substances are quantitatively utilised during tissue formation, it follows that the demand for them will be greatest during the period of most rapid growth—that is, during very early life.[3]

What I wish to emphasise with all possible force is that the food-supply need not be entirely deficient in a factor such as these in order to bring about nutritive failure. A very slight inadequacy operating over a considerable period may be the cause of an apparently insignificant, but in reality very serious, disturbance of the health of the growing child, the effects of which may be marked long after the deficiency has been corrected.

Breast Feeding.

Experimental research has recently shown that the nursing mother is dependent upon her food-supply in order to provide her young with the accessory factors. Physiological evolution has elaborated a wonderful mechanism whereby the composition of the milk is, as far as possible, protected against the effects of dietary restrictions. But this protective process does not appear to extend to the accessory factors. Sacrifice of the mother's own tissues will frequently tide over a period of dietary deficiency as regards protein or energy intake, but only in the case of the "fat-soluble A" can she indirectly make good an inadequacy of accessory factors, and then only to the extent of calling up any reserves of that factor which she may possess. It should, therefore, be appreciated how vitally important is the necessity for an adequate supply of the accessory factors in the dietaries of expectant or nursing mothers. In fact, I go as far as to say that public authorities should emphasise this point with as much vigour as they do the importance of breast-feeding.

If the mother does not receive an adequate supply of these substances two results follow. First, what she does receive probably goes into her milk, for physiological evolution undoubtedly demands development of the child even at the expense of the mother, therefore she herself suffers the effects of a very serious deficiency; and, secondly, the young, in spite of the maternal sacrifice, receive an insufficient amount of the factor for normal nutrition.[4]

This point may be illustrated by the following experimental results obtained with rats.

A young adult female rat was placed upon a diet seriously deficient in "fat-soluble A" as soon as it was observed that she was pregnant. Eight young of normal weight were subsequently born, of which four were destroyed to reduce the task of rearing. For over a fortnight the surviving young grew at a normal rate, during which time it is surmised that the mother was correcting the dietary inadequacy by drawing upon her own reserves of the factor, but they then began to show signs of failing health. The rate of growth declined and both they and their mother showed great susceptibility to infection, particularly a form of external eye disease which will be described subsequently. Two of the young died 31 days after birth from pyogenic infections, and both the mother and the surviving young were then given a normal dietary. One of the young failed to recover, having lost the sight of both eyes and contracted an infection of the lungs, but the mother and the remaining youngster survived and slowly regained their health. After 40 days from birth the young rat appeared normal, and resumed a normal rate of growth upon the adequate ration.

Such a case is typical of a very large number, and exhibits what may be the consequences of a serious deficiency of one factor in the diet. It is improbable that deficiencies of so serious a nature would occur in this country, where even the poorest classes are able to obtain a mixed diet. On the other hand, there is considerable danger that the cost of the chief foodstuffs which serve as sources of the "fat-soluble A"—milk, butter, and eggs—may result in a large number of mothers attempting to nurse their young whilst themselves receiving a dietary more or less inadequate in that factor.

I have carefully followed the results of feeding considerable numbers of rats upon such dietaries, and believe that they may serve to explain certain types of malnutrition so common in the lower classes. As described above, the young rats when born are usually of normal weight unless the mother has suffered from the restriction for some time previous to delivery, when, of course, her reserves may be already near exhaustion. They may also show throughout the period of dependence upon their mother a normal, or only slightly subnormal, rate of growth. But what is most important is that they never exhibit a normal standard of resistance to disease. Amongst rats this very frequently takes the form of a peculiar susceptibility to a characteristic form of external eye disease, which has been classified as a xerophthalmia.

The condition may be only slight if the dietary inadequacy of "fat-soluble A" is also slight; but, on the other hand, it may be so severe as to involve the cornea and result in permanent blindness. I make the suggestion here that much of the low resistance to disease shown by the young of the poorer classes in this country is indirectly due not to any deficiency of protein or calories, but to their having received during a most critical period of their development an inadeqate supply of one or more of the indispensable accessory factors.

Fortunately our varied dietary in this country precludes any great danger from a deficiency of the "water-soluble B," and we need therefore not fear the incidence of conditions as severe as infantile beri-beri. Nevertheless, we should therefore take due precautions to ensure an adequate supply of this factor to the nursing mother.

Equally important is the necessity of providing the suckling child indirectly through the diet of the mother with a sufficiency of the antiscorbutic factor. I have not been able to work this point out experimentally, as the rat shows an extraordinarily low susceptibility to scurvy. This, however, is not so with the human infant, and we must remember that serious damage to health, perhaps with life-long effects, may result from a failure to supply the child with an adequate amount of this substance, although it may be receiving sufficient to prevent the incidence of the typical syndrome of scurvy.

Feeding with Cow's Milk or Modified Milk.

Since the rate of growth of the calf is greater than that of the child we have a certain amount of right to assume that cow's milk is an adequate source of the accessory factors for the growing human infant. This assumption appears to be supported by the fact that children can in certain cases thrive from a very early age on unmodified cow's milk. Perhaps, in such cases, it is wise to guard against a possible deficiency of the factor "C" by occasional administrations of orange juice,[5] for the cow probably represents a species with a low susceptibility to scurvy, and therefore its milk contains little of the antiscorbutic substance.

The modification of cow's milk for infant feeding is a most important problem. In the past pediatricians have had as their aim the preparation of a fluid resembling human milk in its gross composition, and they have therefore made their calculations solely in terms of protein, fat, carbohydrate, and inorganic salts. Such a basis must now be discarded in favour of one which takes full account of the important accessory factors which we have described. If the modification of cow's milk is carried out only with products derived from milk there is little danger that a foodstuff deficient in the growth factors will be obtained. It should therefore be impressed upon all who have to carry out the modification of milk that true success will only be achieved by the employment of such units as cream and whey.

Too little attention is frequently paid to the source of fat used in modifying milk. For instance, one widely adopted substitute for cream is what has been termed "Marylebone cream," a preparation which is in reality an emulsion of linseed oil. This is added to a separated milk product and must therefore result in the production of a foodstuff very seriously deficient in "fat-soluble A," for it has been shown that vegetable oils do not contain this factor.[5] Olive oil, another oil inadequate in this respect, is also employed to no inconsiderable extent for a similar purpose. I have no knowledge what results have been obtained in the feeding of infants with such preparations, but from my experience with animals fed on food mixtures showing the same deficiency I believe it will be found that such children will show a seriously diminished resistance to disease in spite of their having, perhaps, shown a normal development.

Dried and Condensed Milk.

Dried milk is employed very extensively at the present time in infant feeding, and from the very fact that such excellent results are being obtained it appears that the accessory factors which influence growth are being supplied in a sufficient amount. The majority of dried milk is prepared by one or other of two processes, which we may term the "drum" and the "spray" processes respectively. In the former the exposure to a high temperature is probably insufficient to cause any appreciable destruction of factors "A" and "B," but it appears that the antiscorbutic principle may suffer. In the spraying processes, however, the dried milk powder remains in the chamber heated by a current of air at 115° C., presumably until sufficient material has been collected. If this period extends over an hour or two a certain amount of destruction of the water-soluble growth factor may be caused. The majority of condensed milks are prepared by processes which should effect a very inappreciable destruction of the factor "B," and unsweetened condensed whole milk should, when carefully diluted, be an adequate source of the two growth factors "A" and "B." There is, however, very considerable danger in the employment of the other forms of condensed milk. The use of these products is discouraged on the ground that they are, when diluted according to the directions given on the package, seriously deficient in fat for infant feeding. We are here faced by a very important problem. Characteristic symptoms of malnutrition have often been described as following the use of fat-deficient infant foods, and it is most interesting that these symptoms are closely similar to those which are now associated with a deficiency of the indispensable "fat-soluble A." We may therefore ask whether a deficiency of fat is in itself a serious matter for the infant, or whether nutritive failure does not rather result from a restricted supply of the accompanying accessory factor. Personally, I believe the latter view is correct, and that mere corrections of the fat deficiency by the addition of a fat which does not contain the accesssory would effect little, if any, improvement in the health of the child, whereas the employment of an adequate fat, such as butter or cod-liver oil, would at once restore the subject to health. I put forward this suggestion purely as a result of experimental work with rats, and hope that those who make an extensive study of the subject of the artificial feeding of infants will give it some attention.

Proprietary Infants' Foods.

These substitutes for mothers' milk must from their composition in many cases be seriously deficient in both accessory factors "A" and "B," but particularly in the former. Many of them are fat-deficient, and therefore equally deficient in the indispensable accompaniment to milk fat. Here again we may have a partial explanation of the characteristic liability to infection which is so frequently shown by the fat but pasty baby reared upon this type of food. Such dietaries should be adequately supplemented with rich sources of this factor in the form of cream or cod-liver oil, otherwise malnutrition will inevitably follow.

I have not touched on the important subject of infant scurvy because my experimental work with rats has given me no opportunity of studying that deficiency disease. This aspect of the problem has, however, been very fully treated by other workers in a previous paper which appeared in THE LANCET.[5]

It now remains for the practical worker on infant nutrition to apply the results of these experimental studies as soon as he is convinced of their accuracy.

References.—1. F. G. Hopkins: J. Physiol., 1912, xliv., 425. 2. J. C. Drummond: Biochem. J., 1917, xi., 255. 3. J. C. Drummond: Biochem. J., 1918, xii., 25. 4. E. V. McCollum, N. Simmonds, and W. Pitz: J. Biol. Chem., 1916, xxvii., 33. 5 H. Chick, E. M. Hume, and R. F. Skelton, THE LANCET, Jan. 5th, 1918. 6. W. D. Halliburton and J. C. Drummond, J. Physiol., 1917, li., 235.

ROYAL SANITARY INSTITUTE.—A visit has been arranged to Messrs. Pilkington's Tile and Pottery Co.'s Factory, Clifton Junction, at 2 P.M., on Friday, Oct. 18th, and at 6.30 P.M. a discussion will take place at the College of Technology, Manchester, on "Welfare Work in Factories and Workshops," to be opened by Professor J. Radcliffe, M.Sc.Tech., and Miss Ethel Brown (welfare secretary to Messrs. John Bright and Brothers, of Rochdale). The chair will be taken by Dr. Philip Boobbyer. Tickets from the secretary of the Institute, 90, Buckingham Palace-road, London, S.W. 1.

PROPHYLACTIC VACCINATIONS

AGAINST CATARRHAL AFFECTIONS OF THE RESPIRATORY TRACT.

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AND
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AMONGST those who are in the habit of employing vaccines therapeutically in civilian practice the impression has steadily gained ground that sufferers from catarrhal conditions of the respiratory tract are benefited by inoculations prophylactically administered. So far as we know, however, there have never been recorded any extended observations bearing upon the immunity obtained by the ordinary soldier from the prophylactic use of "mixed" vaccine against respiratory catarrh, although Wright[1] and Lister[2] employed pneumococcus vaccines for the prevention of pneumonia in the South African miner and Cecil and Austin[3] used similar vaccines for the protection of the American soldier.

As we have recently had the opportunity of carrying out such a series of inoculations, on a scale which permitted the observation of a nominal roll of 1000, we believe it might be of interest to record our results.

Outbreak of Measles and Rubella Complicated by "Purulent Bronchitis."

During January, 1918, 327 cases of measles and rubella, all of a mild type, were admitted to hospital from a certain camp occupied by the *n*-th Reinforcement of the New Zealand Expeditionary Force, which had arrived in England on the 7th and 9th of the month. During February a further 124 cases were admitted, and of these 24 died.

In consequence of this heavy mortality one of the present writers was detailed, together with Lieutenant-Colonel H. French, R.A.M.C., consulting physician to the Aldershot Command, to investigate the outbreak. In all some 33 cases were inspected, and it at once became apparent that the exanthem was usually complicated by "purulent bronchitis" identical in its clinical features with the outbreak of purulent bronchitis investigated by the same observers in the Aldershot Command during the early part of 1917—that is to say, apart from the rash of the primary measles or rubella, often very indistinct and atypical, the physical signs were insignificant, usually only a few scattered rhonchi, but in all the sputum was abundant, consisting of pure pus, in most instances greenish-yellow, but in two cases reddened by altered blood. In the recent and severe cases cyanosis was pronounced, although the patients were lying flat and not in great distress.

Fourteen cases were selected for detailed bacteriological examination. Of these, three died, and observations were made on the post-mortem material thus rendered available. An autopsy was also made upon an Imperial officer from the same area, who—unconnected in any way with the N.Z.E.F.—had died from purulent bronchitis uncomplicated by any exanthem.

Speaking generally, the bacteriological findings were very similar. *B. influenzæ* was present on one or more occasions in 12 of the 14 sputa examined, usually associated with *Streptococcus longus* and various types of *Micrococcus catarrhalis*. In the fatal cases the heart blood and spleen showed the presence of *Streptococcus pyogenes longus* with marked hæmolytic properties. Thus the analogy with the cases of purulent bronchitis observed the preceding year[4] was complete; there was evidence of a primary infection of the respiratory tract by *Bacillus influenzæ*, which so lowered the resistance of the individual that secondary infection by the *Streptococcus pyogenes longus* (and not the pneumococcus, as in the Aldershot epidemic) ensued, and in many instances resulted in an acute and rapidly fatal streptococcic septicæmia.

[1] THE LANCET, 1914, i., 87.
[2] Publications of the South African Institute for Medical Research, 1916, No. 8, and 1917, No. 10.
[3] Journal of Experimental Medicine, 1918, xxviii., 19.
[4] Purulent Bronchitis. By Abrahams, Hallows, Eyre, and French, THE LANCET, Sept. 8th, 1917, p. 377.

The morbid histology of the pulmonary tissues was similar to that detailed in the "Aldershot" report and consisted chiefly of a purulent bronchitis and peribronchitis associated with areas of œdema, areas of collapse, and patches of lobular broncho-pneumonia, whilst at the bases of the lungs the process tended to involve larger areas, and, in rare instances, to progress to complete consolidation.

The incidence of rubella and morbilli must be regarded, in many instances, as a predisposing cause producing the initial lowering of resistance which facilitated the entry of the *Bacillus influenzæ*; in other cases the eruptive fever appeared to be merely a coincidence.

Details of Cases.

Fatal Cases.

CASE 1.—Admitted Feb. 7th, 1918. Rubella (rash appeared Feb. 5th) and bronchitis. Seen during life—cyanosed—*in extremis*. Typical purulent nummular sputum. Died 3 P.M., Feb. 24th.

Post-mortem same day 5 P.M. (therefore post-mortem decomposition changes negligible). (*a*) *Lung—Naked eye*: Practically sound externally; no consolidation; cut surface exuded thick yellow pus, in some parts frothy. Œdema and collapse. *Microscopically* the condition was one of purulent bronchitis, bronchiolitis and peri-bronchiolitis, with areas of collapse and areas of œdema. Small patches of broncho-pneumonia were present. *Cultures* gave a growth in which, although *B. influenzæ* were present, *Streptococcus pyogenes longus* and *Micrococcus catarrhalis* were the predominant bacteria. (Cultures from the upper lobe showed more *B. influenzæ* than those from the lower lobes.) (*b*) *Heart blood culture*: *Streptococcus pyogenes longus*. (*c*) *Kidney*: Early cloudy swelling, albumin in tubules, hæmorrhage into some glomeruli, few Gram-positive diplococci observed. (*d*) *Liver*: No gross changes; in some parts the liver cells showed some vacuolation.

CASE 2.—Admitted Feb. 8th, 1918. Rubella (rash appeared on Feb. 7th). Bronchitis developed and a second rash (measles) appeared on Feb. 20th. Seen during life: Feb. 24th: T. 101°, P. 130, R. 40; marked cyanosis; typical nummular purulent sputum; very few signs in chest; no consolidation. *Sputum*: Pus cells, Gram-negative intracellular minute bacilli, few Gram-negative micrococci, Gram-positive cocci in pairs and short chains. *Cultures*: *B influenzæ, Micrococcus catarrhalis Streptococcus pyogenes longus, Diplococcus pneumoniæ*. Died during the night of Feb. 24th–25th.

Post-mortem, Feb. 25th.—(*a*) *Lung—Naked-eye*: Consolidation at base, especially right (pieces sank in water). Upper lobes: Patches of broncho-pneumonia. Middle lobe right: No marked changes beyond shotty feel of cut bronchioles; cut surface exudes purulent and frothy mucus. Bronchiolitis and purulent bronchitis. *Microscopically*: The bases showed large areas of pneumonia, progressing in places towards gangrene. Upper lobe: Numerous hæmorrhages and small patches of broncho-pneumonia. Middle right lobe: Purulent bronchitis and peri-bronchial infiltration, with small cells. (*b*) *Spleen cultures*: *Streptococcus pyogenes longus*. (*c*) *Heart blood cultures*: *Streptococcus pyogenes longus* associated with a few *B. coli*. (*d*) *Pericardial fluid cultures*: *Streptococcus pyogenes longus* (conglomerate masses).

A third post-mortem was carried out upon an Imperial officer. The history supplied was:—

Operation on nose Jan. 24th, 1918, Officers' Hospital. Discharged Jan 28th. Sick in quarters Feb. 2nd, after a long motor ride, ? influenza. Readmitted Officers' Hospital Feb. 11th with bronchitis. Sputum frothy; mucopurulent; profuse in amount; bacteria few in number; streptococcus predominant. Cyanosis; oxygen administered. Died on Feb. 24rd.

Post-mortem, Feb. 25th.—Appearances of the lung were practically identical with those noted in Case 2. Owing to the interval that had elapsed between death and the autopsy no material was taken for cultures or for sections, but exudation from bronchi, when examined microscopically, showed pus cells and intracellular Gram negative minute bacilli, in addition to numerous other bacilli and cocci, evidently representing numerous varieties.

Severe Case.

CASE 3.—Feb. 24th, 1918: Rubella and bronchitis. T. 101°, P. 126, R. 32. Very marked cyanosis. Typical sputum. Fine crepitant râles all over chest. No consolidation. *Blood culture*: Scanty growth of *Streptococcus pyogenes longus*. *Sputum*: *Microscopically*—pus, Gram negative intracellular minute bacilli, many simulating diplococci, also Gram-positive cocci in chains and some Gram-negative cocci. *Cultures*: *B. influenzæ*, diphtheroids, short chains of Gram-positive cocci, very few *Micrococcus catarrhalis*. This patient died two days later.

Subacute and Convalescent Cases in Ward 6.

Ward 6 contained 11 patients, all of whom were stated to have had purulent sputum on admission.

CASE 4.—Rubella and bronchitis. Typical sputum. Dullness in right mid-axillary line. *Lung puncture*: Only a few drops of blood withdrawn. Cultures remained sterile. *Sputum* on two occasions (Feb. 24th and March 5th) gave similar bacteriological findings, although the second specimen, naked eye, was less typical and distinctly frothy. *Cultures* on each occasion gave a growth of *B. influenzæ, Streptococcus longus*, and diphtheroid bacilli.

CASE 5.—Rubella and bronchitis. Typical sputum. Convalescent; scroopy rhonchi all over chest, but both lungs resonant. (Blood cultures on Feb. 16th stated to have given (?) pneumococcus). *Sputum cultures*: *B. influenzæ, Streptococcus longus*, few *Micrococcus catarrhalis*.

CASE 6.—Rubella and bronchitis. *Sputum*: March 5th, 1918. *Cultures*: Very mixed growth; some *B influenzæ* present, but large numbers of *Staphylococcus aureus, Streptococcus pyogenes longus, Streptococcus brevis*, and *Micrococcus catarrhalis*.

CASE 7.—Rubella and bronchitis. Convalescent, but still some cyanosis. *Sputum*: Few purulent pellets in abundant frothy mucus. *Microscopically*: Very few Gram-negative intracellular bacilli; numerous Gram-positive cocci. No cultivations made.

CASE 8.—Rubella and bronchitis. Marked cyanosis. Prune-juice-coloured purulent sputum. Sticky non consonating râles all over chest. *Sputum*: Feb. 24th, 1918. Pus cells, blood cells, Gram-negative intracellular bacilli, Gram-positive diplococci. *Cultures*: *Micrococcus catarrhalis, Streptococcus longus, B. influenzæ*.

Subacute and Convalescent Cases in Ward 7.

CASE 9.—Rubella and bronchitis. Cyanosis; typical sputum. *Sputum*: Pus cells and intracellular Gram-negative minute bacilli and diplococcoid forms. *Cultures*: No growth occurred; presumably the tubes were never inoculated.

CASE 10.—*Sputum cultures*: No *B. influenzæ* could be detected. Growth mainly *Streptococcus longus* and *Micrococcus catarrhalis*.

CASE 11.—*Sputum cultures*: Showed only a few *B influenzæ*, numerous streptococci, both of the longus and brevis types, and *Micrococcus catarrhalis*.

CASE 12.—*Sputum cultures*: No *B. influenzæ* could be detected. The growth was a mixed one of *Streptococcus longus* and *Micrococcus catarrhalis*.

CASE 13.—Rubella and bronchitis. T. 102°. Reddish brown (but not typically "rusty") purulent sputum. *Blood cultures*: Scanty growth of *Staphylococcus aureus*. *Sputum cultures*: *B. influenzæ* and *Staphylococcus aureus*. A second specimen of sputum (March 5th) gave almost identical cultures, consisting of *B. influenzæ*, associated with *Staphylococcus aureus*.

Subacute and Convalescent Case in Ward 8.

CASE 14.—Rubella and bronchitis. Cyanosis and typical purulent nummular sputum with intracellular Gram-negative bacilli, resembling *B. influenzæ*.

The few blood counts that were made showed a slight but distinct polymorphonuclear leucocytosis, not only relative, but also absolute. The red cells averaged 4,500,000, and the leucocytes ranged from 10,000 to 12,000. The differential leucocyte count in 8 cases was as follows:—

Case No.	1	3	4	5	7	8	12	14
Polymorphs	77	78·5	81·5	74	64	81	81	77
Lymphocytes	19	19	15·5	23·5	33	15	17	20
Large mononuclears	3	2	2	2	2	2·5	1·5	3
Eosinophiles	1	0·5	1	0·5	1	1·5	0·5	0

Prophylactic Vaccination.

On account of the severity of the infection affecting the Colonial troops in question, and bearing in mind the susceptibility of the average New Zealander to infections of the respiratory tract, and also because of the definite bacteriological findings as stated above, it was thought well to advise the N.Z. medical headquarters of the desirability of attempting, in addition to the improved sanitary measures adopted at the camps, to attempt to immunise reinforcements by prophylactic vaccination against catarrhal infection. This measure was at once authorised and arrangements were accordingly made for the vaccination of the entire personnel of the two most recent reinforcements in England. So promptly did the N.Z. medical headquarters act that within 14 days not only had a large amount of "mixed" vaccine been prepared (from cultivations derived from the cases already detailed), but the initial dose had been administered to several thousand men.

The vaccine was prepared in two different strengths, the weaker initial dose being followed ten days later by the second stronger dose—in each instance the volume of vaccine administered amounted to 0·5 c.cm.

Our first concern was to determine whether initial reactions would prove at all severe and thereby interfere with the necessary training of the troops inoculated. For this purpose reaction record sheets were prepared and sent to each area concerned, together with the following memorandum describing the vaccines and indicating the reactions likely to be observed:—

N.Z.E.F.

Mixed Catarrhal Vaccines for Prophylactic Inoculation against Purulent Bronchitis and Respiratory Catarrhs.

Description of vaccine.—A multiple vaccine has been prepared from organisms contained in the secretions of purulent bronchitis and in the sputa of other catarrhal cases among the troops of England. It contains:—

Organism.	1st dose.	2nd dose.
Pneumococcus	50 ... 100	million*
Streptococcus	10 ... 50	,,
B. influenzæ	10 ... 30	,,
Staph. aureus	200 ... 500	,,

Organism.	1st dose.	2nd dose.
M. catarrhalis	25 ... 75	million.*
B. pneumoniæ	50 ... 100	,,
B. septus	50 ... 100	,,

* Organisms per 0·5 c.cm.

This vaccine has been designed to produce an artificial immunity, not only against the first three virulent organisms, which are frequently found present in fatal purulent bronchitis, but also to immunise against the other organisms most frequently found in

catarrhal sputa and nasal discharges. Its multivalency will not depreciate its value against the more serious cases or prohibit its usefulness in the less serious infections.

Dosage.—The vaccine is prepared for use in two strengths, as described above, each being distinctly labelled for first and second doses. The amount of vaccine to be given on each occasion is 0·5 c.cm; the second inoculation, with the stronger vaccine, to be given after an interval of ten days. In cases which give a severe reaction after the initial dose the second dose should be given, but after a longer interval—say 14 days. Where the prodromal symptoms of measles, &c., are suspected the prophylactic vaccine should not be used, but that arranged for *treatment*, which contains considerably smaller doses and is being prepared.

Reactions to be Expected.

1. *There may be no reaction*, but in such cases the immunity conferred may be as efficient as in those who react. 2. *There may be slight reaction.* This is the most likely sequela, and will probably occur during the 24 hours following inoculation and, apart from a possible tenderness at site of injection, may produce a mild general malaise, tiredness, stiffness, and slight headache. In cases with existing catarrhal discharges these may be temporarily aggravated. 3. *There may be severe reaction.* This is not expected except in a small percentage of cases. Such will develop during the following 24 hours an aggravated condition of the above symptoms, and also probably a rise of temperature and pulse-rate. In these cases at least 14 days should be allowed to elapse before the second dose is given. Severe reactions may possibly occur if the occasion of inoculation happens to coincide with the onset of measles, &c. *Inoculated men should be excused duty for 24 hours.*

Immunity.—The immunity conferred will probably not last longer than 12 months, and it should not be forgotten that there is always a certain percentage of persons in whom it appears impossible to produce any immunity.

Records.—The date of both catarrhal vaccine inoculations should be entered in each man's pay-book, and the letters "M.C.V." (which mean mixed catarrhal vaccine) should be adopted to indicate when the man was inoculated and to prevent the occasion of his catarrhal inoculation being confused later with that of his T.A.B. or A.T.S. inoculations. If men refuse inoculation the fact should be written or stamped in their pay-book, "Refused M.C.V. inoculation," and the date. It will be of great value to have all available data of the immediate result of these inoculations as regards reactions, and for this purpose "reaction record sheets" are enclosed, upon which the reaction results can be entered, and when the bulk of men have been inoculated for the second time these sheets must be forwarded as soon as possible to Medical Headquarters, London, to be sent on to Captain Lowe, N.Z.M.C., pathologist.

Through the details of these returns, so thoroughly filled in by the R.M.O.'s, the following data have been obtained:—

(A) 2081 men inoculated with the initial dose. (B) 1627 men inoculated ten days later with the second dose.

	(A)	(B)
No reaction	2033 = 97·7 per cent.	1607 = 98·8 per cent.
Slight reaction	42 = 2·0 ,,	13 = 0·7 ,,
Severe reaction ...	6 = 0·3 ,,	7 = 0·4 ,,

As *slight reaction* the M.O.'s in charge note: Headache in 24 cases; temperature from 99°–101° in 14; sore throat in 5; neck stiffness, nausea, and fainting in 5.

As *severe reaction* the above symptoms, more marked and accompanied by temperatures between 101° and 104°, are the points noted.

All the men were excused duty for 24 hours on the occasion of both inoculations, and the incapacity occasioned by the severest reactions did not last for more than 72 hours. However, in spite of there being so small evidence of immediate reactions, there was no doubt an increased susceptibility to the prevalent catarrhs of the area, as will be pointed out below, where the records of respiratory complaints in 1000 inoculated men are detailed.

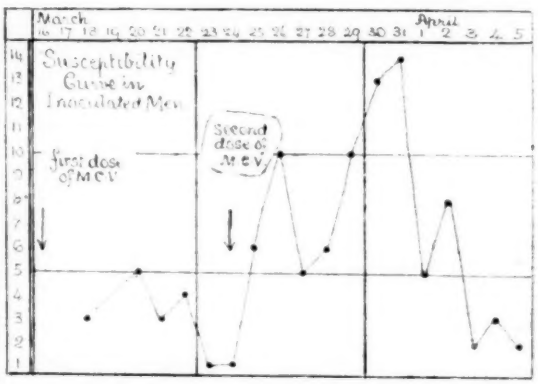
Statistical Record of Results of Vaccination.

Having thus obtained data that showed that the extensive use of catarrhal vaccine would not incapacitate troops in training to any appreciable extent, the next step was to endeavour to obtain some kind of statistical records as to whether these inoculated men had gained any appreciable immunity to respiratory catarrhal complaints, which are the special bugbear of Colonial troops in England. For this purpose a nominal roll was made of the first 1000 men inoculated, and week by week all entries referring to any respiratory complaints reported have been collected.

Further, it was intended to compare these with exactly similar reports received from another selected 1000 men of a reinforcement which arrived in England about six weeks earlier and none of whom had been inoculated with this, or as far as we know, any other catarrhal vaccine. This, however, proved impracticable, and therefore an average of all respiratory complaints occurring per 1000 among the uninoculated N.Z. Troops in the United Kingdom has been arranged as a comparison. The figures thus obtained have been collected independently by the Officer in Charge of Medical Statistics N.Z.E.F., and cover a period from March 15th, 1918, to August 18th, 1918, the prophylactic inoculations being given on or about the 16th and 26th of March respectively.

The experimental work upon which prophylactic, and still more therapeutic, vaccination was originally based showed clearly that, quite apart from the immediate local and general reactions, there supervened a period of lowered resistance or increased susceptibility towards infection by micro-organisms of the same species as those constituting the antigen, and that this so-called "negative phase" varied in extent from a few hours to two or three weeks, in accordance with the size of the dose of antigen, the general physical condition of the inoculated subject, and other factors. We were, of course, fully alive to this aspect of our experiment, and anticipated that during the seven days following the first inoculation and the ten days following the second, there would be an increase in the number of catarrhal affections reported from the troops comprising our nominal roll, and in order that none might be missed arrangements were made for all these cases to be admitted to hospital for observations.

The accuracy of our surmise was proved by subsequent events, as will be seen from the accompanying curve,



showing the relevant admissions from day to day for a period of three weeks from the date of the initial inoculation. Thus 15 admissions were reported between the administration of the first and second doses of M.C.V., and during the ten days following the injection of the second—much larger—dose of vaccine no less than 82 cases were admitted. Of course, most of these were quite trivial, and in the ordinary course of events, and amongst uninoculated men, would never have been admitted, but, nevertheless, even when heavily discounted, these figures emphasise the reality of the "negative phase," and prompt the suggestion that the initial dose might, with advantage, have been somewhat larger, or preferably that the interval between the two inoculations should have been a few days longer.

The subsequent behaviour of our nominal roll towards infections of the respiratory tract is shown in the accompanying table, where the relevant admissions are paralleled with the corresponding admissions per "average 1000" uninoculated N.Z.E.F. in the United Kingdom, to the marked advantage of the former.

Records of Admissions to Hospital with Respiratory Complaints

(A) Of Nominal Roll of 1000 Inoculated N.Z. Men. (B) Of per average 1000 Uninoculated N.Z. Men in United Kingdom.

Week ending—	(A)	(B)	Week ending—	(A)	(B)
April 12th	2	4·3	June 28th... ...	1	14·2
,, 19th	1	3·2	July 7th... ...	0	5·0
,, 26th	0	4·0	,, 14th... ...	0	3·1
May 3rd	2	4·3	,, 21st... ...	0	1·2
,, 10th	1	3·2	,, 28th... ...	0	1·0
,, 17th	2	4·3	August 4th... ...	0	2·0
,, 24th	2	3·3	,, 11th... ...	0	1·4
,, 31st	0	3·3	,, 18th... ...	0	1·1
June 7th	0	4·0			
,, 14th	1	3·2			
,, 21st	0	7·0	Total	12	73·1

The few serological tests we were able to carry out, and to which reference is made below, indicated that an immuno-

logical response had been made by some of the inoculated individuals to the prophylactic vaccinations, but in June Nature stepped in and provided clinical proof of the protection conferred, for in this month a widespread pandemic of "influenza" commenced. The bacteriology of this epidemic has been variously reported upon by different observers, of varying experience, from different areas, with the result that *B. influenzæ*, pneumococci, *Micrococcus catarrhalis*, and other allied organisms have all been implicated. Our own opinion, based upon the examination of material derived from cases occurring in widely separated parts of the United Kingdom, is that *B. influenzæ* was the prime factor in this epidemic, but was associated, particularly in the severe cases, with various other catarrhal organisms (all represented in the strains from which our M.C. vaccine was compounded), and an examination of the figures from our nominal roll shows that the incidence of the "influenza" epidemic was appreciably less amongst the inoculated men than that affecting the "average 1000" of the uninoculated New Zealanders (2 per 1000, as against 28 4 per average 1000), a result which amply justifies the prophylactic use of M.C.V.

Serological Tests.

When the initial inoculations were being undertaken, it was decided to collect samples of blood from a small group of men both before and several weeks after inoculation, with the object of demonstrating by laboratory methods the presence or absence of immune bodies or their subsequent increase in the blood sera.

For this purpose the S.M.O.'s at three different camps in which inoculations were being arranged selected men who on account of their duties were likely to be still available four or five weeks later. In this way 30 samples of blood were obtained and five weeks later a second sample was obtained from 20 of these—the other 10 were not available, having been despatched to other depôts or to France.

Agglutination reactions were carried out microscopically with emulsions prepared from 24 hours' subcultures of each of the seven component organisms of the catarrhal vaccine employed, the dilution of sera used in each case being 1 in 20 and 1 in 200. Throughout the whole series of experiments the greatest care was exercised to maintain uniformity of technique, and all doubtful reactions were repeated and discarded if still doubtful. Controls of sterile saline and rabbits' serum were used with each batch of reactions.

The data given below also included the agglutination reactions obtained as a comparison by using the sera (individually) of 10 English soldiers who had not received any catarrhal vaccine and had not suffered more than ordinarily from catarrhal complaints. This group was included to ascertain whether the average English born and bred soldier has a better natural immunity to the prevalent organisms of catarrh than the average Colonial soldier. The results obtained are as follows:—

Serum of 20 N.Z. Soldiers showing Agglutinins Present. (A) Before Inoculation. (B) After Inoculation. (C) Serum of 10 English Soldiers showing Agglutinins Present.

Organism.	(A)	(B)	(C)	Organism.	(A)	(B)	(C)
	%	%	%		%	%	%
Pneumococcus	20	85	30	*Micrococcus catarrhalis* ...	40	85	40
Streptococcus longus ...	10	75	30				
B. influenzæ	20	95	50	*B. pneumoniæ* ...	0	40	60
Staph. aureus	90	100	90	*B. septus*...	15	80	40

These percentages are drawn from far too small a number of cases to allow of much weight being accredited to them, but from what there is it appears (1) that the average colonial, just arrived in England, has only about 50 per cent. of the natural immunity to the organisms of catarrh prevalent in England that the average English soldier enjoys; (2) that as the result of catarrhal vaccination his immunity can be considerably increased; and (3) that, at any rate for a time, his specific agglutinins to catarrhal organisms exceed in amount those of the average Englishman.

THE Madras Government have decided that lady assistant surgeons shall be employed and granted the same rates of pay and allowances as those drawn by the members of corresponding classes in the male medical service.

THE DIAGNOSIS OF EARLY PHTHISIS.

BY ALFRED FOSTER, M.R.C.S., L.R.C.P. LOND.,
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THIS paper is written from the point of view of a general practitioner. Text-books help very little when the general practitioner is called on to diagnose phthisis without the aid of physical signs. He has only one guide, and that is the effect of the poison of tubercle on the patient.

Having seen the characteristic attacks that occur amongst sanatorium patients during the quiescent stages of their disease, induced by some indiscretion, usually over-exertion, I began to think that if it were possible to recognise this toxæmia it would be possible to diagnose phthisis without physical signs. The indiscreet patient some 24 hours after his indiscretion loses his appetite, feels seedy all over, coughs a little more, and has more or less rise of temperature, and usually tells you he has had an attack of influenza. Now as the attacks occur in patients who are not suffering from secondary infections it seems reasonable to suppose that the poison is tubercle pure and simple.

I would like it to be quite clearly understood that the cases of hæmoptysis, and pleurisy with effusion, both of which are frequently the first indication of the presence of tubercle, are not referred to. These symptoms should be a sufficient guide as to the course to adopt.

The Symptoms of Pulmonary Tuberculosis.

With these reservations and explanations borne in mind the symptoms of pulmonary tuberculosis may be grouped as follows: (1) Cough and expectoration; (2) loss of weight; (3) loss of appetite; (4) rise of temperature. It can safely be taken for granted that no phthisis can exist without these symptoms in the ordinary way. The number of cases in which one or more of the symptoms is absent is very small. Each symptom is open to wide variations in severity.

In any case the picture presented by tuberculous toxæmia is sufficiently regular to enable a diagnosis to be made with a fair degree of accuracy. General seediness and loss of energy are frequent complaints and may accompany the above symptoms, or recurrent influenza is complained of, but these four symptoms are inseparable.

The cough.—This symptom is the only guide to the situation of the focus and varies very greatly in intensity. One case will cough to vomiting, another will not be aware of the cough and inquiries must be made from friends in order to obtain the information. A common history is that of a small bout of coughing on rising in the morning and the expectoration of a small quantity of mucus; in fact, a regular "morning clear-up." The amount of expectoration may be almost negligible and the cough would appear to be more the result of a reflex irritation than from a local cause, such as excessive secretion. Here let me say that the great majority of the cases I have seen originally diagnosed as bronchitis have been cases of tuberculosis with an unusually large amount of bronchial catarrh. My experience lies mainly in Australasia; I have very considerable doubts as to the existence of bronchitis except in the very old and young, where there is no evidence of irritation due to occupation or asthma with an unusual quantity of secretion. What occurs in Europe I do not know, but in this country bronchitis without any broncho-pneumonia is, I believe, unknown.

Loss of weight goes hand-in-hand with *loss of appetite*. There is little evidence that it is due to the wasting produced by some toxæmias, and would appear to be due to the lessened intake of food, plus defective absorption due to the digestion being out of order. The number of patients who seek advice on account of indigestion caused by tubercle is considerable, the indigestion being so great as to mask all the other symptoms. Thus it is a safe rule to follow that patients whose habits of eating, drinking, smoking, and tea-drinking are good, whose teeth are adequate, whose gums are clean and free from suppuration and stumps, and who are not constipated, should always be suspected of phthisis if they are dyspeptic or loth to eat and are losing weight. Short of actual dyspepsia, patients will tell you that, though hungry, on going to table very little satisfies them, and they can eat no more. A patient who "runs down" easily, loses weight quickly and picks up equally quickly on having a holiday, is probably tuberculous. The history of patients whose summer holiday has staved off the onset of phthisis for years is common and characteristic.

The Temperature.

This is the most characteristic feature of the disease. Speaking broadly, there can be no active phthisis without temperature. The characteristic chart is a subnormal temperature in the morning and a slight rise some time between 2 and 6 P.M., the daily variation being from 97° to 99·2° F. or more.

The question arises, What must be considered a rise above normal? Without going into details, it may be taken that a temperature of 99·2° as usually taken in the mouth is pathological. The rise may not occur every day; during the attack of "influenza" it will surely be present, and an attack may be induced by extra exertion and a clear history be given of feverish attacks following some unusual amount of exercise.

I would say here and now, without any reservation whatever, that it is impossible to make a diagnosis of phthisis without the aid of physical signs unless it is possible to have a record of the temperature, preferably every two hours. Demonstration of bacilli in the sputum is the only other unfailing guide. Cases do occur in which phthisis is present without temperature, but these are cases of comparatively long standing and which are in the quiescent stage, such as is induced by sanatorium treatment in quite a number of cases. Sooner or later a relapse occurs and the temperature rises, and there is generally a good deal of cough and expectoration. Such cases, however, are rare, as this is not the time at which the patient seeks advice.

The mouth temperature does not always reveal the truth, so when a case is in doubt a rectal temperature must be taken. There is a general idea abroad that the rectal temperature should be above normal: this is a mistake. The failure of the thermometer to rise in the mouth is due to faulty technique, nothing else. Influences that raise or lower the temperature of the mouth take a very long time, in minutes 30, or more, to pass off.

I would say that the chief bar to early diagnosis of phthisis is the difficulty of obtaining a reliable temperature chart.

Sources of Fallacy in Diagnosis.

There are a few conditions which may simulate tuberculosis, but associated with troubles that are fairly obvious if care is exercised in taking the history: The pre-menstrual rise of temperature in some women; cases of dilated stomach; some cases of anæmia, or latent pyosalpinx. All may show slight rises of temperature during the day. No doubt other causes can be found, but they are not common, and the cause is fairly obvious with careful examination.

It must be borne in mind that phthisis is a disease which remits. Few cases commence and progress without remission to a fatal termination, and a history which points to attacks of tuberculous toxæmia extending over a series of years is quite common. Also, these patients respond most wonderfully to a little help for the time being. I have found that a short stay in hospital with a view to the accurate observation of temperature is quite worth while.

I would like also to point out that tuberculosis officers, though probably much better able to interpret physical signs owing to the constant practice they have, are no more in a position to make a diagnosis where no signs exist than anyone else, unless they are able to secure a record of the temperature. In short, I believe that the solution of the trouble of diagnosis rests in the provision of means whereby the temperature can be recorded, till some reliable and easily applied test for active tuberculosis is discovered.

There is, however, no royal road to the diagnosis of phthisis except by this means, and all the complaints about the inability of the practitioner to make the diagnosis are due to the lack of appreciation that phthisis is a disease of symptoms as well as of signs. If he is provided with the necessary temperature chart the rest is quite simple, as an early phthisis chart is about as characteristic as any chart made.

Conclusion.

Lest anyone should be in doubt as to what I wish to point out, I would like to say that in my experience the case that has definite physical signs is quite an advanced case in most instances, and therefore if we desire to do the best for our patient we must discover his disease before physical signs are present. Given adequate facilities it can be done.

I see by the latest literature arrived since this paper was written that a suitable antigen for a complement deviation test of tuberculosis has been discovered. I hope it will prove reliable on extended trial.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

AN OPERATION FOR THE CURE OF PTERYGIUM.

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THERE being a great tendency for pterygium to return after it has been removed from the cornea, various plans have been devised to prevent this; but while the more simple frequently fail to secure against return the more successful demand considerable incising of the neighbouring conjunctiva and displacement. Considering the advance over the cornea to be due to some *vis a tergo*, I conceived the idea of removing the direction of the growth into a direction which would be harmless if it persisted by inverting the head or part growing over the cornea, under the body, or thickened conjunctiva, and as this is done with the greatest simplicity and in the few cases I have done it has proved entirely satisfactory I consider it merits a trial by those who are frequently called on to treat this disease.

A short snip with scissors is made into the neck or junction of the head and body, just outside the cornea both above and below and the body undermined, keeping close to the sclera, for a distance of several millimetres, which varies with the length of the head we are to invert; the scissors blades closed are then passed under the neck and by a rapid upward jerk made to strip the head from the cornea. The tip of the head is then gripped by strabismus forceps; each end of a thread of No. 2 silk 8 in. long is carried through a needle, and the needles are inserted from without inwards through the head just behind the forceps, one near its upper and the other near its lower border; the needles are then by a director pushed under the body, carried horizontally under it, and made to pierce it from within outwards about 10 mm. from the cornea. The needles being removed the ends of the thread are crossed in a half knot and pulled upon till the head is inverted and the neck about 1 mm. free of the cornea when the knot is completed. If the head is a long one the needles are passed through it about 2 mm. from the neck and then the head within this snipped off vertically by the scissors.

The suture is pulled out after ten days. The narrow bare area of sclerotic outside the cornea soon becomes covered over with epithelium, and no obvious pocket or fold of the conjunctiva is to be seen after a few weeks.

A CASE OF STAPHYLOCOCCUS PHLEBITIS.

BY C. WYNDHAM GITTENS, L.R.C.P. LOND., M.R.C.S.,
HOUSE PHYSICIAN, ADDENBROOKE'S HOSPITAL, CAMBRIDGE; LATE HOUSE PHYSICIAN, UNIVERSITY COLLEGE HOSPITAL, LONDON.

I HAVE not been able to find any account of phlebitis or thrombosis due to the *Staphylococcus aureus*. The history of the case is as follows:—

Patient, aged 58, farm labourer, was admitted on Dec. 23rd, 1917. A week before his left leg began to swell; also history of pain in leg chiefly in front of left thigh and behind left knee, and especially in region of left saphenous opening. No history of rheumatism, gout, or typhoid fever, nor of any local septic condition. On admission the superficial veins of left leg and thigh were more marked than those of right limb; there was soft swelling of whole of left leg and thigh (lymphatics did not seem affected), pain on pressure over left popliteal space and along course of left femoral vein. No thrombosis of superficial veins; no evidence of any endocarditis.

On Jan. 2nd, 1918, he complained of pain in calf of right leg, which was swollen; on careful examination a superficial vein was found to be inflamed and tender. On Jan. 4th whole right leg and thigh were œdematous; right internal saphenous vein and several smaller superficial veins of leg were thrombosed. On this day a bought vaccine of *B. coli* was given, and three (increasing) doses of this vaccine were given at intervals of ten days without any good result.

Patient was admitted with T. 102° F., and he ran septic temperatures until last week in February, when evening rise above normal ceased.

On Jan. 14th there was some suggestion of thrombosis affecting probably the mesenteric veins; abdomen distended, stools offensive and contained blood to the naked eye. This condition passed off after a week; an agglutination test was done; no agglutination to typhoid or to paratyphoid B.

On Jan. 25th T. still very septic; evening rise to 102°, morning T. 100°. Blood culture; *Staphylococcus aureus* grown, and suspected to be accidental, but a second culture showed same result. From this a vaccine was prepared and was given on Feb. 14th when the T. came down to normal for first time. There had been a very definite reaction to the dose of coli vaccine given on evening of Jan. 8th; the T., which had been coming down, rose on Jan. 9th to 103·4°. After that of Feb. 14th (*Staphylococcus aureus*) there were some occasional rises of T., but these gradually subsided, and on and after Feb. 23rd it remained quite normal. The doses of vaccine were gradually increased; definite reactions after third and fourth injections. Blood culture on Feb. 11th showed no growth.

A further complication of interest is that on Feb. 27th a small carbuncle developed on sacrum; this was opened and scraped and gave no trouble. In the pus *Staphylococcus aureus* was present.

Patient gradually improved and was allowed up on March 7th. Still slight œdema of leg. He went home on March 27th wearing elastic stockings.

The temperature strongly suggested a septicæmic condition, and the discovery of a staphylococcus on blood culture made us hope that we had discovered the cause, although we realised how easily the culture may have been contaminated. The result of vaccine treatment was very heartening and proved that the organism was the staphylococcus. I am indebted to Sir Clifford Allbutt for permission to record these notes.

Reviews and Notices of Books.

The Action of Muscles. By W. COLIN MACKENZIE, M.D., F.R.C.S., F.R.S. Edin., Member of the Council of the Anatomical Society of Great Britain and Ireland; formerly Lecturer on Applied Anatomy to the University of Melbourne. Illustrated. London: H. K. Lewis and Co., Ltd. 1918. Pp. xvi.–267. Price 12*s.* 6*d.* net.

Gymnastic Treatment for Joint and Muscle Disabilities. By H. E. DEANE, Brevet-Colonel, R.A.M.C., in charge of War Hospital, Croydon. Illustrated. London: Oxford Press Warehouse. 1918. Pp. 146.

Dr. Colin Mackenzie's original work is a milestone of advance in our knowledge of the function of muscle. While much of it is revolutionary, the author makes out a fair case for his conclusions, which may be briefly summarised by reference to a few concrete examples. There is a physiological law that if a muscle contracts, the antagonist must relax, and we know that supination of the forearm and forcible extension of the elbow are not incompatible. If, then, the biceps were a flexor of the elbow, it would be called upon to relax during the action of the extensor, and, at the same time, contract as a supinator. The conclusion is therefore drawn that the biceps is a pure supinator, does not act as a flexor, and its antagonists are the pronatores teres and quadratus. The antagonist to the triceps is the only true flexor of the elbow—viz., the brachialis anticus. So, too, the old-time controversy as to the rotatory action of the ilio-psoas is done away. It is accredited with the power of flexing the hip only, while the gluteus maximus becomes a pure extensor of this joint. Turning to the fingers, we find that the extensor communis is shown to extend only the metacarpo-phalangeal joints, the lumbricals serving as antagonists; while the proximal interphalangeal joints are flexed by the sublimis, the distal by the profundus, the interossei being given as antagonists to both. The brachio-radialis is shown to be a pure supinator. Evidence in favour of the author's argument is forthcoming as the result of ingenious research in comparative anatomy, and is presented in convincing manner. We anticipate that the bulk of these conclusions, doubtless in somewhat modified form, may later become commonplace knowledge. The author indicates their practical application in muscle rest and re-education, and this will form an attractive study for those engaged in physical therapeutics, and serve to promote independent thought and research rather than the present uncritical absorption of preconceived doctrines. But we find the author a little sanguine in expecting that many of his patients will be ready to carry out the treatment he advocates for 20 minutes four to six times a day. On the one hand, the simplicity of the author's method is a great attraction; we fear, on the other hand, that monotony may be found a serious drawback. But no one who practises physical treatment can afford to ignore his ideas or to dismiss the conclusions untested or the treatment untried.

Colonel H. E. Deane's book should be read and studied as a sequel to Dr. Mackenzie's, although in many respects it is its exact antithesis. Dr. Mackenzie approaches his subject from the standpoint of the comparative anatomist and reaches his conclusions by pure scientific reasoning. His theme is the re-education of muscle. Colonel Deane deals exclusively with the restoration of function. He leaves argument aside, and in one place at least throws science to the winds when he says that the intricacies of muscular association "defy anatomical differentiation." The author expounds two main elementary facts and shows us their application. The first point, so admirably emphasised again and again, is that recovery of function entails voluntary effort; and the second, that it is futile to regard a limb as an entity, but that rather we must consider the whole body when attempting to restore a limb to usefulness. Thus he points out the great value of the leg exercise involved in climbing a rope while training a patient with an arm injury to grip, and of work on the parallel bars should the leg have been injured. The key-note is associated movement, and the plea made is for exercise of every sound muscle in the body, be it strong or feeble. But above all is emphasis laid on what we can only describe as the re-education of volition. Colonel Deane has much to say on the use of mechanical appliances in restoring of function, and he makes out a strong case against it. On the other hand, he acknowledges that in using gymnastics as a remedial agent "a good deal depends on the ingenuity and personal qualities of the instructor." Only those who have had the privilege of seeing Colonel Deane's work at Croydon can realise the great weight these two factors can carry. There will be few, indeed, who can copy, but all who are responsible for the care of the injured should attempt to emulate. The simplicity of the apparatus used by Colonel Deane is a great attraction. The barest gymnasium would be for him fully equipped. The text is well and clearly written and furnishes all that is required as a guide; detail of application can only be attained by experience. The book is well produced and the numerous illustrative cases should prove of great service.

The methods advocated in these two books taken together should provide for the injured of the future a hope of more rapid and more perfect restoration than has been the lot of those who have suffered in the past.

Diseases of the Male Urethra, including Impotence and Sterility. By IRVINE S. KOLL, B.S., M.D., F.A.C.S., Professor of Genito-Urinary Diseases, Post-Graduate Medical School and Hospital, Chicago. London and Philadelphia: W. B. Saunders Co. 1918. Pp. 151. 14*s.*

THIS book comprises a number of sections, including the anatomy of the urethra; the diagnosis and treatment of gonorrhœa and its complications; stricture of the urethra; non-gonorrhœal urethritis; tumours of the urethra; impotence and sterility. The book is conspicuous for its conciseness and the absence of excessive detail in the treatment of the conditions dealt with. It is a little surprising in a work professing to deal fully with the subject of gonorrhœa to find the use of irrigating methods not more fully discussed, but the author has confined himself principally to the methods used in his own clinic. The illustrations are excellent, including many original drawings and coloured urethroscopic pictures. The articles on sterility and impotence are quite short and very useful. The book should prove useful to the practitioner.

Aspects of Death and Correlated Aspects of Life in Art, Epigram, and Poetry. By FREDERICK PARKES WEBER, M.A., M.D.Camb., F.R.C.P. Lond. Third edition, revised and much enlarged. London: T. Fisher Unwin, Ltd., and Bernard Quaritch, Ltd. 1918. Pp. 784. Price 30*s.*

WE reviewed the first and second editions of this informing work, then going under a slightly different title, in THE LANCET of Dec. 17th, 1910, and August 22nd, 1914, respectively, so that we have but little to add as concerns this, the third edition, except that it is nearly five times the size of the first. The increase is due both to large additions to the text and to many more illustrations. The second edition ran to 461 pages. The subject, of course, is almost inexhaustible, and Dr. Weber's book might easily be expanded into a volume the size of the Post Office Directory. In his account of monuments of the "gisant" type—i.e., those in two compartments, showing the deceased both as he appeared in life and as a skeleton or a mouldering corpse—we think that Dr. Weber might have referred to those monuments of which a few examples exist in England—namely, where the dead are represented clothed in a shroud. We can call to mind five such—one in the south choir aisle of St. Paul's Cathedral in memory of Dr. Donne, also interesting as being the only monument which escaped the Great Fire, and the other four in Maidstone Parish Church to the memory of two John Astleys, father and son, and their wives. All four figures are represented as standing in their shrouds. Of punning monuments, to which Dr. Weber refers on p. 7, there is an interesting example in a City church,

either that of St. Katherine Cree or St. Giles', Cripplegate, to a person by name Cage. The monument mainly consists of a heavily barred iron grating, through the bars of which are looking out a number of skulls. Finally, there is one mortuary inscription which Dr. Weber should certainly add to those quoted by him; it is in the cloisters of Winchester College, and runs as follows: "Sub hoc marmore sepultae sunt reliquiae Thomae Welstead, quem calculi impetu atra mors abstulit Non. Mart. 1676. Primus erat in schola, nec, ut speramus, ultimus in caelo, quod pro Oxonio adiit." There is something unconsciously humorous in recording the fact that the boy arrived in Heaven instead of Oxford. After the war we hope that Dr. Weber will issue a fourth edition which shall include, so far as can be done in one volume, the literary aspects of Death.

MONOGRAPHS ON INDUSTRIAL CHEMISTRY.

Organic Compounds of Arsenic and Antimony. By GILBERT T. MORGAN, D.Sc., F.R.S., F.I.C., A.R.C.Sc. Pp. 376. Price 16*s.*

Colour in Relation to Chemical Constitution. By E. R. WATSON, M.A.Cantab., D.Sc. Lond. Pp. 197. 12*s.* 6*d.*

Coal and Its Scientific Uses. By WILLIAM A. BONE, D.Sc., Ph.D., F.R.S. Pp. 491. Price 21*s.*

The Applications of Electrolysis in Chemical Industry. By ARTHUR J. HALE, B.Sc., F.I.C. Pp. 148. Price 7*s.* 6*d.*

London: Longmans, Green, and Co. 1918.

Dr. Morgan has done medical science good service by writing this interesting survey of the organic compounds of arsenic and antimony which have found such wide application in treatment during recent years. It is medicine, in fact, which has given a stimulus to this branch of research, with the result that many organic compounds of arsenic and antimony of interesting theoretical structure have been prepared. The starting-point was cacodyl, or Cadet's arsenical liquid, produced for the first time, as Dr. Morgan tells us, by Louis Claude Cadet de Gassicourt, as far back as 1760. Great chemists, like Bunsen, Berzelius, and Frankland, saw the significance of the discovery, inasmuch as it meant that an analogue of the alkali oxides had been formed in which the elementary alkali radical is replaced by a compound organic radical. Later followed the elaboration of the organic arsenical medicaments now familiar to us by such names as atoxyl, salvarsan, neosalvarsan, galyl, and others. It was not surprising to find that similar antimony compounds could be prepared, since antimony and arsenic are chemical twins, and so the aromatic stibines were brought into being, and further researches are producing other metallic organic combinations, as, for example, mercurial compounds. Dr. Morgan has written a very interesting monograph, which, besides indicating what British chemical industries can do, should advance our knowledge of the pharmacology of the substances described, and should help us to fathom the relationship of chemical constitution to physiological action.

Dr. Watson's book has also an interest for medicine, since the dyestuffs have a well-known application in medical research and in some cases are employed in therapeutics. The relation between colour and constitution is a fascinating line of practical study, but, as Dr. Watson points out, the quest for the ultimate cause of colour has revealed the great complexity of the problem and has shown the need for further work in this direction. It is obvious that as this relationship is revealed the chemist should be in a position to produce any colour or shade at will. The book is valuable as a record of the facts and developments of research so far as they have gone in an important field of investigation.

It need hardly be said that the publication of Professor Bone's book on "Coal and Its Scientific Uses" is opportune at the present time when we are all forced to consider very seriously the problem of fuel economy in the coming winter. The potential energy of coal has been scandalously wasted in the past through the lack of applied scientific method in employing it for fuel purposes. The directions in which reforms are needed are clearly and most interestingly pointed out by Professor Bone, and the economic lines suggested, by utilising to the full the calorific value of coal, would, when established, mean an asset of inestimable value to the nation. We have read with particular interest the chapters on domestic heating and the smoke nuisance and its abatement, since we have published many practical contributions in connexion with these problems. The book is a valuable addition from the national point of view to the interesting series of monographs, which are ably edited by Sir Edward Thorpe.

Amongst industries to which the war has given a great stimulus come those in which electrolysis has been employed instead of purely chemical methods for the production of certain chemicals. Mr. Hale's book outlines very clearly the electrolytic applications in chemical manufacture which so far have been successfully and economically developed. A very good example, and of interest to medicine, may be quoted of the advantages of the electrolytic method in the production of iodoform. The old method of producing this antiseptic was by the action of iodine upon alcohol in the presence of sodium carbonate, but only 30 per cent. of the iodine by this process goes to form iodoform. By electrolysing alkali iodide, however, in the presence of alcohol the whole of the iodine used goes to form iodoform. Saccharin is produced also electrolytically, but the book is devoted mainly to accounts of the electrolytic production of the great industrial chemicals, chlorine, bleaching powder, caustic soda, white lead, potassium permanganate, and others. There is also an interesting chapter on the electrolytic winning of metals, such as copper, zinc, lead, nickel, and sodium. It is interesting to observe that as far back as 1807 metals were produced by electrolytic methods by Humphry Davy; it has taken us the best part of a century to put this great scientific discovery into practical application. Mr. Hale's work is illuminating on a subject of real importance in industrial affairs.

Treatise on Cystoscopy and Urethroscopy. By Dr. GEORGES LUYS. Translated and edited with additions by ABR. L. WOLBARST. London: Henry Kimpton and Co. 1918. Pp. 386.

As the authors in their preface state, the object of the book is to bring before the profession the results of their efforts as the product of 15 years' practical endoscopy. The book not only deals with the ordinary urethroscopic and cystoscopic methods, which are dealt with in great detail, but also goes into the various applications of these methods and the various uses to which the modern forms of apparatus can be put—e.g., ureteric catheterisation, direct vision cystoscopy, endo-urethral treatment of prostatic hypertrophy, the endo-vesical treatment of bladder tumours, and so forth. Each of these subjects is dealt with in a self-contained chapter, illustrated profusely with pictures and records of cases demonstrating the practical value of the methods and difficulties likely to be met with in carrying them out. In addition there are a large number of coloured drawings representing the appearances of normal and abnormal conditions of the urethra and bladder as seen through the urethroscope and endoscope respectively; these give a rather exaggerated view of the usual appearances seen, still they serve a useful purpose in pointing out the details which it is essential for the endoscopist to recognise. The book is certainly the best that we have seen dealing with this very important subject, both as regards the technique and the difficulties which are likely to be met with. It may be recommended both to the beginner and the expert cystoscopist as a useful addition to his library. It also serves another purpose in stimulating the use of the direct vision endoscope, which should have a more prominent place in the armamentarium of surgeons in this country than it has at the present time.

A Diabetic Manual for the Mutual Use of Doctor and Patient. By ELLIOTT P. JOSLIN, M.D. Philadelphia and New York: Lea and Febiger. 1918. Pp. 187. Price $1.75.

WE have recently reviewed at length (THE LANCET, 1917, ii., 936) Dr. Joslin's comprehensive work on the "Treatment of Diabetes Mellitus." The manual before us aims at securing the intelligent coöperation of the patients, and thus enabling the general practitioner to raise the standard of his treatment to the level of recent discoveries in laboratory and clinic. The manual is arranged in four parts. Part I. the author calls a diabetic primer, giving in untechnical language a rapid survey of the whole subject. Part II. covers the same field in greater detail and outlines the treatment of the severer diabetic. Part III. consists of diet tables and recipes. Part IV. gives simple tests for estimation of sugar and acid bodies. The whole is well arranged and illustrated, and will, we think, well serve the author's aim.

THE LANCET.

LONDON: SATURDAY, OCTOBER 12, 1918.

The Coming Ministry of Health.

AT the meeting of the medical profession held on Oct. 1st in Steinway Hall, having for its object the securing of more adequate representation of the medical profession in Parliament, Dr. CHRISTOPHER ADDISON, the Minister of Reconstruction, alluded to the Bill for the erection of a Ministry of Health in terms suggesting that there was now no doubt that such a measure would be considered at an early date. Dr. ADDISON could not pledge the Government to any particular date; nor, we think, would it be possible for the Government to arrange any programme of domestic legislation whatever to which strict adherence could be expected, having regard to the military and political position of the country, and indeed of the world. The plight and attitude of the Central Empires and our engagements to our Allies in Europe and to the United States of America alike preclude any possible statement that such and such a thing will be certainly done in Parliament by a certain date; there is, however, no reasonable doubt that a Bill will be promoted at the earliest opportunity. The medical profession is consequently feeling its want of representation in the House of Commons, for, in the absence of any public statement as to the provisions of the Bill, there are no channels of discreet information such as most certainly lawyers would be able to employ if a measure were in question of first-class importance, dependent for its working upon the legal profession. It is quite reasonable where a new Bill is concerned that, its general scope and purport having been made clear, no details should emerge until the Bill is read in the House of Commons. But, as a rule, legislation bearing intimately upon the life-work of one section of the community, however entirely public and national its broad bearings are, has been promoted by leaders of that section, or in response to combined work and opinion of that section, and in this way the class most closely interested is aware of what is in store for them. The Ministry of Health Bill has no lineage deriving directly from the medical profession, it is intended to be, more or less in Dr. ADDISON'S words, an "assortment of different departmental responsibilities in health matters," and this assortment has been made in general recognition of the fact that "the most urgent national needs should be made the duty and responsibility of a definite body of men."

We need not here recapitulate the circumstances which have called for such assortment. We all know that six (or more) State Departments at the present moment discharge duties in connexion with the people's health, and we know, also, the particular medical work for which the various departments stand guardian. Those familiar with the medical aspects of legislation in the making will also understand how it has come about that so many different State departments find themselves in possession of a medical bureau and in charge of medical responsibilities. The story here is exactly illustrative of British methods of progress, where the results, though in certain directions they may in their latest developments be found comic, are none the less expressions of very genuine progress. The Poor-law Commissioners of 1834 perceived that ill-health was a principal source of pauperism, and that the removal of the causes of ill-health ought to be a more economical proceeding than the treatment of its consequences; and early public health legislation contained the germ of a national health department. The nation at the time did not appreciate the meaning of the work which was beginning. But medicine, leaping forward from theory to accurate knowledge, became first an official aid and then an inspiriting counsel to further effort; and soon sections of the community became alive to the fact that in various directions they could be relieved of masses of evil, to whose pressure they had hitherto resigned themselves. The public learned that through preventive medicine and sanitation barriers to their health and happiness could be removed which were standing with no better apology than could be found in their antiquity. And as this or that class in the community was aroused it made its claim for relief heard and obtained such remedy as it could get. Schemes of reform initiated in this manner to meet various emergencies were entrusted for their carrying out to various departments of Government and various local authorities. Promptitude was obtained at the time, but there has followed overlapping of jurisdictions, with waste of energy and money, while the resulting confusion has been worse confounded by the creation of new Government Departments and the rearrangement of local administrative machinery. The outcome has been to make the care of the health of the people, as conducted in this country, a medley in which great ideas and brilliant accomplishments are blended with the extravagance and dissipation of strength associated with the want of a central plan. All this has been for many years perfectly obvious to the medical profession, as well as to men and women whose public life has brought them into contact with the truths of our social existence. With them the feeling has been implicit that the health of the people, being a national asset, should have the national supervision of a Government Department. And now the whole nation agrees.

It is to tidy up the muddle that the Bill in the first instance will be promoted by Government, but all medical men look forward to something a great deal more, and a great deal more is expected by the country. For this reason medical men will regard the method in which the new Ministry is kept in touch with modern medicine with interest and even jealousy. The actual administrators of a Ministry of Health must be medical men; the prime authority must have the best services of medicine at call, a desideratum

which is provided for in the workmanlike Scheme for a Ministry of Health put forward by the British Medical Association. We do not think that anyone would suggest otherwise, and if the Ministry is put into possession of a strong Consultative Medical Council from the beginning, chosen on proper lines so that the right men get on this statutory committee for the right reasons, the task of assortment of duties will proceed with much greater ease. For undoubtedly there are difficulties ahead. It is quite easy to laugh at the fact that, for example, the Privy Council is the supreme midwifery authority of the country, and yet it finds itself in that position for perfectly logical reasons; and a representative body of medical men, knowing how the anomaly arose, will know how to end it. There will be difficulty in adjusting the claims of the new Ministry of Health in respect of, for example, the physical welfare of children where the Board of Education is deeply interested, and the sanitary conditions of factories where the Home Office is at present a very judicious authority. The affiliation of medical research to medical practice will be a fundamental necessity in the new legislation. The National Health Insurance Commission at the present moment conducts an admirable Research Bureau on funds raised by itself. The claims of the nation and the rights of the National Insurance Commission can only be adjusted satisfactorily by a thoroughly competent Consultative Medical Council, and the constitution of this body will be the most important part of the forthcoming measure, which does not propose to institute a State medical service.

The Early Diagnosis of Pulmonary Tuberculosis.

EARLY diagnosis is the essential factor in the treatment of pulmonary tuberculosis, but there is still a tendency to attach too great weight to the physical signs alone. We may recall two of the aphorisms of the late Dr. SAMUEL GEE: "Therapeutics must begin before physical signs have developed; for if you wait for physical signs you wait too long"; and "In any case of phthisis the disease is more extensive than the physical signs would seem to indicate."[1] Conversely, extensive physical signs may be left after arrest of the disease, and may be consistent with health and freedom from all activity of the old pulmonary lesions. It is necessary in every case, before making a diagnosis or advising treatment, to review the history, the symptoms, the physical signs, the general condition of the patient, and sometimes his reaction to varying conditions, especially where there is no sputum for examination. We publish in our present issue an admirably suggestive article on this question by Mr. ALFRED FOSTER, of Christchurch, New Zealand, emphasising the importance of these considerations for the general practitioner, to whom, in a large proportion of cases, the opportunity for the early diagnosis of pulmonary tuberculosis is afforded. If the doctor suspects the onset of phthisis before the actual development of unequivocal physical signs, and takes steps to establish the diagnosis by a careful review of all the information available, the patient may be enabled to secure treatment under the most favourable conditions. Mr. FOSTER was impressed by the attacks which occur in sanatorium patients, usually induced by some indiscretion, such as over-exertion. These he describes as associated with loss of appetite, feeling seedy all over, increased cough, and with more or less rise of temperature. Such attacks are sometimes referred to as due to auto-inoculation, and are doubtless the result of the action of the products of the tubercle bacillus. Mr. FOSTER classifies these symptoms as follows: (1) cough and expectoration, (2) loss of weight, (3) loss of appetite, and (4) rise of temperature. He urges that the concurrence of these conditions should lead to a careful examination of the evidence in favour of pulmonary tuberculosis, and in particular that a careful and continuous record of the temperature should be taken. Too often this association of symptoms is attributed to recurrent influenza, or to trivial catarrhal conditions, and thus the opportunity for early diagnosis and treatment may be lost. Such evidences of auto-inoculation, especially if continuous or repeated, should give point to slight and dubious signs or tend to a diagnosis even in the absence of signs. Attacks like this are commonly observed *within* sanatoriums while the patient is under treatment, and Mr. FOSTER thinks their nature should be recognised as suggestive in patients *without* sanatoriums before a diagnosis is established.

[1] Medical Lectures and Aphorisms. By Samuel Gee. London: Smith, Elder. 1902.

A Risky Experiment in Municipal Hygiene.

LAST week London had an opportunity of observing on a large scale what it throws away each day into the streets. Normally this pot-pourri is collected each night by sweepers, and what remains is washed away by watercarts and revolving brushes into the gutters. But for several weeks on end a dispute in regard to a war bonus induced the public servants whose task it is to perform these duties in the Borough of Holborn to stay away from work until their demands were granted on Tuesday last. The spectacle was not an edifying one. In the chief lines of thoroughfare cigarette-boxes, large pieces of paper, and matches constituted the main bulk of the obvious debris, with only a moderate admixture of dried horse dung, inasmuch as the traffic is mainly driven by motor-spirit, gas, or petroleum, and what horse traffic there is is rapid. In the side streets and alleys the amount of horse dung was remarkable, in many places being spread in a continuous adhesive layer over the wood pavement, and on asphalt surfaces, to which it adheres but little, forming a deposit ankle deep in the gutters. Many of the courts and blind alleys were half filled with paper, straw, and other packing material, much of it doubtless carried by the wind into these quiet backwaters. Though the actual stable-yard impression was limited to the Borough itself, dried dung much resembling chaff was carried some distance over its borders, its presence betrayed by an unusual number of feasting pigeons. Fortunately, the weather was favourable for such a bold experiment in municipal hygiene. The air was cool and fresh, and little if any unpleasant odour was present, while the wind was not strong enough to blow clouds of dried dung into the faces of passers-by, but this we owe rather to the clerk of the weather than to the clerk and other authorities of the Borough. There was no obvious accumulation, as might have been expected, of dog dung; presumably the unpleasant habit of urban dog-keeping

is not practised generally in the central district. Nor were the pavements covered with the viscid layer succeeding the shower of sputum described by eye-witnesses as the outward and visible sign of the debouchment of Lancashire workfolk from their factories. The metropolis may have the advantage in this respect.

It will be interesting to watch the health returns of Holborn in comparison with other London boroughs for the dirty week. The first impression of the naive observer may well be some degree of amazement at the apparent smallness of the nuisance which has resulted. And it has even been asked, why fuss? The reply to this laissez-faire attitude is afforded by the accumulated experience of hygiene the world over. Nothing is more certain than that dirt lowers the average health of a community. This is its chief condemnation, and it holds true even though an occasional lapse in a normally clean city cannot be reckoned upon to produce striking epidemics from which to draw sanitary lessons. There were, as a matter of fact, no deaths in the Borough last week from epidemic diarrhœa, although if the weather had been hot and dry it might have been quite otherwise. But even so, simple lessons are there to draw. One is immediate and obvious, and concerns the general public. It is never a tidy habit to throw into the street packing material of any kind, and now when it has its immediate market value it is stupid as well as thoughtless. For the future the riddance of horse traffic from crowded city precincts is seen more than ever to be advisable, and can hardly fail to have some effect in raising the general level of public health.

Annotations.

"Ne quid nimis."

FORMS AND INFORMATION.

PRIMITIVE folk set little value on the written word, and a few reams of paper would suffice their needs for a life-time. Increasing civilisation goes hand-in-hand with the increased use of paper, and the Public Health Acts, and especially the National Insurance Act, have resulted in the medical profession acquiring, if with reluctance, the habit of using abundant printed forms. In respect of the use of paper, indeed, the medical profession may count as a primitive folk, for the large bulk of general practitioners among us make few clinical records, their prescriptions are brief, and letter-writing is almost a lost habit for lack of leisure time. The consumption of paper by the official runs to enormous dimensions, as double entry has taken the place of single, and as for convenience of office routine documents have become quadrupled and quintupled. In commercial life the use of paper to push the sale of articles may be said to be roughly inversely proportionate to their value. It is therefore a satisfaction to find a recent edict of the Local Government Board making a clean sweep of many official documents when they attain a sufficient age. Six-year-old treasurers' books, cash books, and petty cash books, inventories, collectors' books, and a host of others, the existence of which was hardly suspected, may now be sold to the waste-paper merchant with great relief both to office and paper-supply. Notifications of diseases, births, and the like, may be pulped on the expiration of 12 months from the completion of the audit of the last entry contained in the records, or in the case of other documents, "as may be considered desirable." For our part we cannot see how a notification of infectious disease can possibly serve any useful purpose after it has been entered up by the medical officer of health on his spot-map or schedule. And the same must surely apply in some measure to a host of other documents. In the case of Poor-law documents, public vaccinators' registers, medical relief lists and indices may now be released when over six years old, but not the registers of vaccination officers. Medical officers' record cards, temperature charts, and dietary books may all go sooner. This more rapid turn-over seems to us entirely of a salutary nature. Might not, in fact, a small amount of paper in rapid circulation between town hall and pulper serve every possible purpose? The hoarding of forms is the result of sloth and want of enterprise on the part of those who should abstract from them the essential information for current use. Hoarded forms are not only waste of paper, but they are actually harmful by appearing to convey information which, in fact, they simply bury. Perhaps the shortage of paper will last long enough for the form hoarding habit to disappear and for its place to be taken by rational abstracting and indexing.

PTERYGIUM.

AMONG the many obscure points which puzzle the ophthalmic surgeon the condition of pterygium presents special difficulties; its origin, its development, and its tendency to relapse and recurrence, all offer problems which are still to solve. Much has been written of its causation, but without bringing to light the solution of the riddle. Some writers lay great stress on the influence of race; others deny any racial influence and consider the difference of incidence to be climatic only. Certainly, the disease is not common in England; equally certainly, it is comparatively common in some climates; it is said to be endemic in Madeira. Nor is its mode of development much clearer; the theory, originated many years ago, that the fold of conjunctiva is pulled over the cornea by the gradual inward progress of an ulcer at the tip of the fold, seems definitely disproved; but what process it is which leads to the destruction of Bowman's membrane, and the adhesion of the conjunctiva to the cornea, is still discussed. Certainly, the position of the folds in the line of the palpebral fissure leads one to think that irritation probably has some part in the production of pterygia; but occasionally they are found in other meridia; again, what part, if any, in the causation is played by the pinguecula? Is there any real share, or is the supposed relation nothing but the coincidence of position? All these points await solution; and in this country the material is so scanty that we have done little to throw light on the subject. The arrival of a large number of men from the uttermost parts of the earth during the last few years has increased this material, and has offered opportunities for operation greater than we have hitherto had. In operation the chief point has been to overcome the tendency to recurrence; for this reason the pterygium has been transplanted in various directions; but it has been considered an essential to cover the region of the sclerotic, laid bare by the removal of the growth, by means of conjunctival

flaps taken from healthy conjunctiva. In the note which is published elsewhere in our present issue Major G. F. Alexander suggests a method which is very like the methods of Galezowski and of Bettman in the manner of dealing with the pterygium by rolling the head, or part near the cornea, under the body. This process Bettman called "subvolution" or "subinvolution," but both these operators were careful to cover the raw surface. Galezowski and Bettman laid it down that the presence of the conjunctiva against the sclerotic tended to prevent a relapse. Major Alexander has not found recurrence in those cases in which he has left a raw surface. Unfortunately, he does not tell us the condition of the pterygia on which he operated. Although all pterygia are pathologically the same—at least this is the received opinion—they are not all the same in their clinical behaviour; some are much more liable to relapse and recurrence than others. If Major Alexander's cases were all of the form called clinically p. crassum, his observation and results are most important. If, on the other hand, the cases were p. tenue, it does not follow that he would be equally successful with the other form.

POISONING FROM EXHAUST GAS.

TWO years ago attention was drawn[1] at a French Army medical reunion to the risk from exhaust gas in motor ambulances. Fatal cases of poisoning had been observed where the exhaust-pipe of the motor was leaky, the post-mortem lesions suggesting carbon monoxide poisoning. In a recent number of the *Journal of the American Medical Association* Dr. C. W. H. Hitchcock has added another instance occurring in civilian life. A chauffeur entered a small close garage about noon to do some work on the car. About two hours later a maid sent to call him could hear the engine running but got no answer. She produced a key and unlocked the door. The man was found in the seat of the car dead, the engine still running, and the door and windows closed. There was a pinkish red discolouration all over the body. The internal organs were found normal and the blood saturated 58 per cent. with CO. In another case a man, aged 30 years, went to his garage on a cold morning, started the motor, and returned to the house. After a few minutes he went back to the garage to oil the car. While doing so he smelt something very sweet and had a desire to laugh. He saw yellow flashes before his eyes and felt weak at the knees. His first thought was to sit down on the running board, but he decided to return to the house. When just outside the garage he felt a sudden throbbing of the temples and extreme weakness. An hour later his wife found him lying in the snow apparently asleep. He could be roused, but staggered, and could not walk alone. He was put to bed and went to sleep. After an hour he awoke, complaining of dizziness, and was unable to walk. He complained of a throbbing headache, and talked incoherently. He apparently recovered and returned to work on the following day, but he talked incoherently and was unable to remember dates and other simple facts. When he returned home in the evening he remarked that he could not get any sense out of the evening paper which he was trying to read. During the night severe headache and cough began. A fatal attack of pneumonia followed. As we pointed out when the French cases occurred, the explanation is not quite simple. Exhaust gas ordinarily contains a minimal quantity of carbon monoxide, and it would require 600 c.cm. of CO to saturate the three litres of blood in the vessels of the average man. But whatever the precise toxic agent may be it is evident that neither garage nor ambulance should be without means of ventilation.

[1] THE LANCET, 1917, i., 161.

THE INTERDEPENDENCE OF THE SYMPATHETIC AND CENTRAL NERVOUS SYSTEMS.

THE current number of *Brain* contains a paper by Dr. David Orr and Dr. R. G. Rows that is of interest rather for its suggestiveness than for its record of actual research. The work of these two observers has been instrumental in distinguishing clearly two types of morbid invasion of the nervous system, the lymphogenous and the hæmatogenous. In the case of the former the lesion results from the involvement of the ascending lymph paths of cranial or spinal nerves, and the phenomena which arise are essentially those of a primary inflammation of the fixed tissues. In the case of the latter, experiment has shown that invasion of the nervous system by the blood stream brings about coagulation necrosis of cells, degeneration of fibres, œdema, dilatation of the vessels, and hyaline thrombosis, with practically no inflammatory reaction. In the cord these lesions are found almost entirely, in the first instance, round the cord margin and on either side of the median septum of the posterior columns. Lymphogenous infection causes lesions which spread by direct continuity; hæmatogenous infection appears to result in unexpectedly limited lesions both in brain and cord—the brain lesions are almost always, if not always, confined to the cortex, cornu ammonis, and amygdaloid nucleus. These areas, both in brain and cord, derive their blood-supply from the vessels of the pia arachnoid. This peculiar and special anatomical distribution, to the total exclusion of the central areas, suggests that the theory of a general intoxication via the blood stream requires considerable qualification. In other words, some other factor than mere blood dissemination is necessary to explain this curious limitation of blood intoxication in both divisions of the central nervous system. Dr. Orr and Dr. Rows believe that evidence can be advanced in favour of the view that the sympathetic nervous mechanism may be an important factor in determining at which points a toxin circulating in the blood shall exercise its primary action upon the central nervous system. They base their argument on a consideration of certain cases of spinal cord change due to toxic conditions of the blood stream—e.g., in visceral cancer, Addison's disease, and subacute combined degeneration of the cord associated with severe or pernicious anæmia. If the spinal cord is examined in these cases changes are found not of an inflammatory but of a degenerative nature, mainly in the posterior columns in the vicinity of the septum, and also towards the periphery of the cord; in subacute combined degeneration the changes are, as a rule, much more profound and widespread, although their character is the same. Further, considered vertically, these alterations occur chiefly in the lower cervical, dorsal, and upper lumbar segments. The authors next point out the difficulty of explaining non-systematised yet peculiarly limited lesions by the action of a general morbid agent, and suggest that this cord localisation can be correlated with the spinal distribution of the thoracico-lumbar sympathetic system. As for the cervical lesions,

the sympathetic afferent fibres of the lower cervical cord come from the stellate ganglion, which consists in a fusion of the first two or three thoracic ganglia. The suggestion, then, is that the cord lesions of the conditions above enumerated are due to some interference with the thoracico-lumbar sympathetic "reflex," caused possibly by pathological stimuli, or by the absence of substances which maintain its balance. This results in dilatation of the pial vessels, whose permeability is thus increased, whence diffusion of noxious substances and resulting degeneration.

PARAFFINED GAUZE.

THE introduction of gauze which has been smeared or soaked in paraffin, either soft or liquid, is comparatively recent; yet this form of dressing has several merits, and there can be no doubt that it will be more widely employed in future. Attention is drawn to it in the article on Gunshot Wounds of Joints, by Captain J. Campbell, the first part of which appears in the present issue of THE LANCET. He points out that among its merits are these: it exerts pressure, and so restrains hæmorrhage; it does not furnish a moist medium in which micro-organisms can flourish; it does not tend to adhere to the surface of newly formed granulations, and when it is removed the surface does not tend to bleed as when moist gauze is employed. There is a further advantage to which Captain Campbell does not allude, and that is that as it does not tend to adhere to the granulating surface its removal does not cause nearly so much pain as does the removal of a piece of gauze which has been moistened with a watery fluid. Some surgeons prefer that the gauze should be prepared by soaking in sterilised liquid paraffin, while others think that better results are obtained by using soft paraffin. Further experience may show which is the better method of preparation.

THE WATER-SUPPLY OF THE COUNTRY.

IT was stated at a meeting of the Municipal Waterworks Association last week that a system of national control of watersheds was urgently needed in order to secure to the community a fair division of the country's supplies. Many of the large watersheds had already been secured and some authorities had come to the end of their present resources and were looking afield for an enhanced supply. Big cities like Glasgow, Birmingham, and Manchester soon found that their supplies drawn from lake districts were hardly adequate to the needs of a population growing rapidly year by year, and various schemes from time to time have been considered with the view of increasing the quantity of water. It is a fact that in many thickly populated parts of the country nearly all the most accessible areas are now taken up, and the suggestion has been made that the Government should exercise some control over the nation's water-supply in order to secure for each town and district an adequate quantity of water based upon the population at a reasonable cost. In connexion with this subject Sir Alexander Houston, the Director of Water Examination, Metropolitan Water Board, has written a useful little guide dealing with rural water-supplies and their purification.[1] As he points out, despite the enormous improvements in our public water-supplies, not only as regards quality and quantity of water, but in respect of its availability to isolated communities, there remains a large but scattered population, whose only source of a primary necessity of life is rain-water or the water from shallow wells. The utilisation of rain-water is largely Sir Alexander Houston's theme, and he gives directions as to how this is best done with simple methods of purification and sterilisation. The one difficulty with rain-water appears to be to render it palatable and free from sooty taste. Slow filtration through charcoal gives the best results.

[1] Rural Water-Supplies and their Purification. By Alexander Cruikshank Houston, M.B., D.Sc., F.R.S. Ed. London: John Bale, Sons, and Danielsson, Ltd. 1918. Pp. 136. Price 7s. 6d. net.

LOCAL CANCER RESEARCH: REPORT OF THE MEDICAL OFFICER OF HEALTH OF WOOLWICH.

Dr. Sydney Davies, medical officer of health of Woolwich, has for some years been conducting research in regard to cancer, and in his annual report of 1917, just available, he states that the period had the lowest cancer death-rate for five years; the reduction being greater in men. As compared with 1913, and previous years, in men there had been a decrease under carcinoma of the throat and intestines; and in both men and women an increase of cancer of the stomach. The special inquiry into the habits of persons suffering and dying from cancer since 1912 was continued. The scope of this and the standards taken are shown in previous annual reports. The following table gives the parts affected for males and females:—

Parts Affected.

Seat of primary disease.	Male.	Female.	Total.
Face, mouth, jaw, and tongue	35	7	42
Pharynx, œsophagus, larynx, and neck	37	6	43
Stomach and pylorus	29	22	51
Intestines (excluding rectum)	16	14	30
Rectum and anus	17	17	34
Liver	9	4	13
Breasts	—	8	8
Uterus	—	4	4
All other...	11	2	13
Total	154	84	238

Further analysis of the cases shows:—

Seventy-four of the patients were stated to be excessive users of alcohol, 22 took the standard quantity, and 127 below the standard. There were thus 33 per cent. of excessive alcohol-drinkers. 91 smoked excessively, 18 consumed an average quantity of tobacco, and 113 below the average, giving 41 per cent. of excessive smokers. 65 were excessive tea-drinkers, 89 moderate, and 54 small tea-drinkers, giving 31 per cent. of excessive tea drinkers. 99 were large eaters, 72 moderate, and 48 small eaters, giving 45 per cent. large eaters. 71 were large meat-eaters, 86 moderate, and 57 small meat-eaters, giving 33 per cent. of large meat-eaters. 130 had a daily action of the bowels and 44 suffered from constipation, giving 75 per cent. of persons with a regular action.

Control or non-cancer cases.—These cases may be compared with those obtained for 218 persons of similar or greater age, living under similar circumstances, who did not die of cancer. Of these, 37 took alcohol excessively, 24 took the standard quantity, and 157 below the standard, giving 17 per cent. excessive drinkers. 46 smoked excessively, 19 in moderation, and 157 were non-smokers or slight smokers, giving 21 per cent. of excessive smokers. 66 took tea excessively, 96 in moderate amount, and 48 were small tea-drinkers, giving 31 per cent. of excessive tea-drinkers. 28 were large eaters, 22 moderate, and 13 small, giving 44 per cent. of large eaters. 19 were large meat-eaters, 9 moderate, and 36 small, giving 30 per cent. large meat-eaters. 166 had a regular daily action of the bowels, and 26 suffered from constipation, giving 14 per cent. of constipation.

It will be seen that, comparing persons who suffer from cancer with those living at advanced ages, or who died at advanced ages through other causes,

the great differences are as to habits with respect to alcohol, smoking, and the action of the bowels. Cancerous persons had 33 per cent. of excessive alcohol users, 41 per cent. excessive smokers, 31 per cent. excessive tea-drinkers, 45 per cent. large eaters, 33 per cent. large meat-eaters, and 25 per cent. of constipation. Non-cancerous persons, living to a greater age, had 17 per cent. of excessive alcohol users, 21 per cent. excessive smokers, 31 per cent. excessive tea-drinkers, 44 per cent. large eaters, 30 per cent. large meat-eaters, and 16 per cent. of constipation. These differences are still more marked with respect to alcohol and smoking, if only those who died from *cancer of the mouth and throat* are considered. Of 103 persons dying from cancer of the lips, tongue, jaws, fauces, larynx, œsophagus, and cervical glands, 46 (or 45 per cent.) took alcohol excessively, while 73 (or 71 per cent.) smoked excessively. Twenty-eight of these smoked chiefly a clay pipe, 27 a briar, 3 cigarettes, and 3 cigars. There were only 5 out of the 37 cases of cancer of the mouth and tongue who did not smoke; 3 of these had bad teeth. Among the non-cancer cases all the smokers smoked pipes (42 clay and 25 briar, and 5 both), except 2 who smoked cigarettes. Of 161 cases with cancer of other parts than the mouth and throat 39 (or 24 per cent.) took alcohol excessively, and 36 (or 22 per cent.) smoked excessively. It would appear, then, that both alcohol and smoking (especially alcohol) have some general effect in promoting cancer, but chiefly exert their injurious influence locally. This is shown also as regards alcohol by the figures given below for cancer of the stomach, which occupies an intermediate position. Of the 103 cases of cancer of the mouth and throat, 28 (or 27 per cent.) were excessive tea-drinkers. Tea-drinking does not seem to be specially injurious locally or generally as far as cancer is concerned. If the injurious effect of smoking were chiefly due to the local effect of heat one would have expected excessive drinking of hot tea to have had a similar result. Of 13 cases of *cancer of the stomach*, 8 were large eaters and 2 were large meat-eaters; and of 52 cases 16 (or 31 per cent.) were excessive alcohol-drinkers. As regards *cancer of the bowels*, out of 59 persons dying from cancer of the intestines, 32 had a regular daily action, and 26—i.e., 44 per cent.—had constipation. The above results in tabular form are as follows:—

—	All cancer cases.	Cancer of mouth and throat.	Cancer of other parts.	Control cases (non-cancer).
	Per cent.	Per cent.	Per cent.	Per cent.
Excessive alcohol-drinkers..	33	45	24	17
,, smokers	41	71	22	21
,, tea-drinkers ...	31	27	34	31
Large eaters	45	—	—	44
,, meat-eaters	33	—	—	30
Constipation	25	—	—	16

Thus constipation seems to predispose to cancer of the bowels.

MEDICAL SOCIETY OF LONDON.—A general meeting of this society will be held at 11, Chandos-street, W., at 8 P.M., on Monday, Oct. 14th, when the treasurer's report and balance-sheet will be presented, and the new officers will commence their duties. The first ordinary meeting of the session will follow at 8.30 P.M., when the incoming President, Major Arthur Francis Voelcker, R.A.M.C., will deliver the opening address, to be followed by a demonstration on "Degeneration in Art, Music, Science and Literature," by Dr. Theo. B. Hyslop.

TRENCH FEVER:

A CRITICAL ANALYSIS OF THE REPORT OF THE AMERICAN COMMISSION.[1]

BY SIR WILLIAM OSLER, BART., M.D.

I.—*Introduction.*

THIS handsome volume of 446 pages represents the work of a commission appointed at the suggestion of the Medical Research Committee of the American Red Cross, the official sanction for which dates from Jan. 11th, 1918. A Trench Fever Committee, consisting of Major H. Cushing, Major H. F. Swift, and Major R. P. Strong, was appointed, to which was added Major J. W. McNee, R.A.M.C., as an honorary member. It was arranged with the authorities that the work should be carried on at a stationary hospital of the B.E.F., near enough to the line to catch cases of trench fever in the very early stages. The members of the Commission were Major R. P. Strong, Major E. L. Opie, Major H. F. Swift, Captain W. J. MacNeal, Captain W. Baetjer, and Captain A. M. Pappenheimer, all of the Medical Reserve Corps, A.E.F., and Captain A. D. Peacock, R.A.M.C., as entomologist, and subsequently attached First Lieutenant Rapport, A.E.F. From the start there was active coöperation between the British and American authorities, and in framing the plan of research the Commission had the benefit of the advice of Colonel Leishman, General Bradford, General Herringham, and Colonel Beveridge.

The suggested problems for investigation were the method of the transmission of the disease, and the infectious properties of the blood, with a view of repeating and confirming the previous work of Major McNee. Since, so far as was known, the disease is not transmissible to animals, the next problem was to secure volunteers for the experiments. This was arranged by General Ireland, chief surgeon of the A.E.F., with the Commander-in-Chief, with the proviso that each volunteer was to have the nature of the experiments fully explained, and that he should sign a paper expressing his willingness to undergo the experiment. Sixty volunteers were selected out of hundreds who applied, and subsequently 14 were added. All underwent a careful examination to exclude any unfit, and then bacteriological examinations were made of the blood, urine, and fæces. Four-hourly temperature charts were taken, semi-weekly inspections were made of the bodies and clothing, followed by a bath, and the clothing was sterilised once a week. The men of the experimental detachment were segregated from the British hospital personnel and patients. As it was realised that the time was limited before the spring offensive began the experiments were planned to be completed within approximately two months' time. Major Swift took charge of the clinical work, Major Opie the bacteriological investigations, Captain Pappenheimer the serological studies, Captain Baetjer the inoculations, Captain MacNeal and Captain Peacock conducted the louse investigations, while Major Strong directed and superintended the work and prepared the report for publication. On March 27th, for military reasons, it became necessary to evacuate the trench fever detachment from the hospital where the work had been progressing for two months. The necessary experiments to complete the investigation were made at the American Red Cross Hospital, Neuilly.

The study of the problem of transmission involved the investigation of the infectious properties of the blood, sputum, urine, and fæces, the differentiation of the disease from the forms of enteric fever, and particularly the agglutination curves of inoculated subjects. 103 different human experiments were carried out in connexion with the transmission of the disease and its cause, of which 28 were in connexion with blood transmission, 38 transmission by lice, 16 in connexion with the urine, fæces, and sputum, and 21 in connexion with the virus. The disease has been produced experimentally by different methods in 62 instances.

II.—*Story of the Disease.*

In the autumn of 1915, at a C.C.S., Dr. G. H. Hunt, of Guy's Hospital, showed the writer cases of fever characterised by short paroxysms, with a tendency to recurrence.

[1] Trench Fever: Report of Commission, Medical Research Committee, American Red Cross. At the Oxford University Press. 1918.

Major J. H. P. Graham gave the first description in THE LANCET (Sept. 25th, 1915), and other papers followed by G. H. Hunt and A. C. Rankin (THE LANCET, 1915, ii., 1133) and J. W. McNee, E. H. Brunt, and A. Renshaw (*Brit. Med. Jour.*, 1916, i., 225). Sir Wilmot Herringham early recognised that it was a disease unlike any of the ordinary forms. We then began to have cases admitted to the hospitals in this country with the diagnosis of trench fever, characterised by short paroxysms of pyrexia and a curious complication—viz., painful shins. The disease came to be widely recognised on the Western front in both Allied armies, in Germany (where it was called Wolhynian fever, His-Werner or five-day fever), in Salonika by Hunt, in Italy and in Mesopotamia by Coombs. It became very frequent and one of the principal causes of sickness. Captain E. R. Grieveson stated (THE LANCET, 1917, ii., 84) that trench fever formed 40 per cent. of his hospital evacuations and at one time 60 per cent. of all cases of sickness. McNee (loc. cit.) states that it is the most serious disabling disease of the soldier in the Western armies, and with scabies constituted fully 90 per cent. of all cases of sickness in one of the British armies. A majority of the cases labelled P.U.O. are believed to be due to it. The question of the relation of trench fever to other diseases is discussed in Chapter II. by Major Strong, whose large experience in the tropics gives weight to his opinion that it cannot be definitely identified with any hitherto-described disease.

The *incubation period* has been proved to vary from 14 to 30 days, though if a large dose of the virus is acquired the period may be shorter.

"*Symptoms and course.*—During the incubation period slight prodromata, as headache and pain in the limbs and slight fever, are occasionally noted. The most characteristic clinical features of trench fever are the sudden onset, accompanied by headache, dizziness, pain in the legs and back and behind the eyeballs, particularly when moved, nystagmus on turning the eyes completely sideways, injection of the conjunctivæ, and a sharp rise of temperature to 103° or 104° F. The fever in over one-half of the cases subsequently assumes a relapsing character. Enlargement of the spleen and the appearance of small erythematous spots or papules occur in from 70 to 80 per cent. of the cases. The erythematous spots are observed particularly over the chest, back, and abdomen. They are usually not raised above the surface of the skin, are pink in colour, disappear on pressure, and generally measure about two to four mm., although sometimes they may measure from four to six mm. in diameter. Occasionally the rash is distinctly papular in character. In number the spots vary from several to one or two hundred. They often disappear in less than 24 hours after their appearance, and they may occur early in the fever, as on the second or third days, or be first observed just prior to or during a relapse. While no one of these symptoms given above can be regarded as characteristic or constant, the presence of several or all of them usually serves to make the diagnosis of trench fever accurate. The urine often shows a trace of albumin, but evidence of true nephritis is not present. The leucocyte count is very variable. There is frequently a leucocytosis, and the leucocytes may rise at the time of the relapse. In other cases, however, the count may be normal or there may be a leucopenia.

The fever does not always follow a definite type, but may consist of, first, a short attack, lasting for about a week, with sometimes, but not always, after a few days, a single short rise; second, a more prolonged initial fever, sometimes lasting for six or seven weeks, with relapses not distinctly marked; and, third, a more regularly relapsing fever, with more or less definite normal intervals, lasting from five to seven days. Many variations of these types of fever are also seen, and in some of the patients there may be a long fever lasting from 40 to 60 or more days with only very slight remissions." (p. 16.)

The number of relapses varies: three to five periods are common, and there may be as many as seven. Recovery follows in all cases.

III.—*Specific Nature.*

Chapters III. and IV. deal with this question. The first point to determine was whether there was any evidence of infection with the enteric group of organisms. The examination of the blood, urine, and fæces of spontaneous and experimentally produced trench fever by methods adopted to demonstrate typhoid and paratyphoid bacilli were uniformly negative. An extensive study of the agglutination tests gave no support to the view that trench fever was a modified enteric infection. The details of this study, as given in Chapter IX, are most interesting. The titre of the serum in individuals inoculated against the enteric group was in a few instances modified by the trench fever, but in neither a constant nor a characteristic way. This is the first opportunity there has been for a careful bacteriological study of so many cases of a pure strain of trench fever produced by inoculation through successive generations, and the authors hope these investigations will terminate the controversy regarding the relationship of the disease to the enteric group. Examinations of the blood were also made to exclude other known forms of infection. Anaerobic cultures were studied by the dark-field microscope for spirochætes with negative results. No definite micro-organisms were discovered by any of the known means of examination.

McNee, Brunt, and Renshaw first demonstrated that the disease was infectious and transmissible by the blood. Seven men were inoculated with the whole blood, and all developed the disease. One inoculated with clear serum remained healthy, one inoculated with hæmoglobin-tinted serum developed the disease; of two cases inoculated with washed corpuscles one did and one did not, while none were infected who received inoculations with filtered serum. These crucial experiments of McNee and his colleagues made in 1916 received ample confirmation by the American Commission in February, 1918. Thirty-four of the volunteers who had been carefully studied in every possible way were inoculated either with blood or some constituent element of blood taken from trench fever cases in the febrile stages, of whom 23 contracted the disease. The results agree in a number of points with those obtained by McNee and his colleagues. The blood is always infective in the early stages. They found the incubation period to be from 6 to 22 days, the American observers from 5 to 20.

"They, however, consider that the organism of trench fever was intracorpuscular and not free in the plasma or serum. They, however, performed only one experiment with plasma, and though the disease was produced in an individual inoculated with it, they concluded that it was infective only because hæmolysis of red cells had occurred, the plasma being tinged with hæmoglobin. In another case they produced the disease with hæmoglobin-tinted serum and drew the same conclusion, as in another case they failed to produce the disease with clear serum. We also failed in one case to produce the disease with clear centrifuged serum. In relation to the production of the disease with washed corpuscles, McNee, Brunt, and Renshaw performed two inoculations. One of the men developed trench fever, the other did not. We obtained positive results with washed blood corpuscles in three instances, and have already discussed the significance of them (p. 27) and pointed out that apparently the virus remained so intimately mixed with the corpuscles in these experiments as not to be separated by washing with saline solution. Our conclusions, based on the results of our experiments, differ from those of McNee and his colleagues in that we believe that the virus or organism of trench fever is present particularly in the fluid portion of the blood, and is not contained within the blood corpuscles themselves" (p. 28).

Extensive experiments were made to determine the filterable qualities of the virus. The original must be consulted for details, but three positive experiments, of five performed, demonstrated that at least in one stage of development the virus of trench fever is filterable and ultramicroscopic.

"It was found that the virus resists a temperature of 60° C. moist heat for 30 minutes, and is fully virulent after such treatment, but is killed by a temperature of 70° C. moist heat for 30 minutes. Obviously, therefore, a temperature of 55° C. for 30 minutes, which destroys the louse *Pediculus humanus* and its ova, does not suffice to destroy the virus of trench fever which may be present on the underclothing of trench fever patients. The details concerning these experiments are given in Chapter XII., p. 284."

The authors conclude that the outlook regarding a method of vaccination against the disease does not appear particularly hopeful.

IV.—*Etiology and Mode of Transmission.*

In Chapter V., after a review of previous investigations, the conclusion is reached that the causative organism of the disease remains undiscovered. The blood is invariably infective in the early stages. The virus was not found in the fæces, and attempts at inoculation failed; but it was present in the urine, and sometimes in the mixed sputum and saliva, as shown by successful inoculations. Chapter V. deals with the mode of transmission, in which the authors demonstrate conclusively the rôle played by the louse. Various suggestions had been made as to the part played by lice, mosquitoes, fleas, rats, and mice, and the literature is fully considered. Weldon and Davies, in 1917, made the first experiments with lice, and on Feb. 3rd in THE LANCET reported a successful case of transmission. There had arisen a strong feeling that the disease was lice-borne, supported actively by Hurst, Hunt and McNee, Grieveson and others, but adequate proof was not forthcoming. The Commission undertook the investigation of the problem.

"*Transmission experiments.*—Thirty-eight healthy men from the 82 volunteers referred to in Chapters I. and IV. were employed in the experiments relating to the transmission of the disease by *Pediculus humanus*, var. *corporis*, as well as a number of other healthy volunteers who were employed as controls. Twenty-six of the men were employed in the first group of louse experiments and 12 in the second. ..... In the first group of experiments the object particularly in view was to demonstrate whether *Pediculus humanus*, var. *corporis*, does or does not transmit trench fever. In the second group the experiments were performed particularly with the idea of giving further evidence of, first, whether the louse may transmit the disease in nature by its bite alone, as well as by its bite when living under artificial conditions; second, the length of time the louse is infective in this respect; and, third, the infectivity of filtrates of suspensions of louse excrement known to contain the virus before being filtered."

In a majority of the experiments a pure-bred strain of lice obtained from the Lister Institute was used. A plan was adopted by which the lice lived as naturally as possible upon the experimental subject, confined in a chamber or cell in which they bred and laid ova.

"*Transmission by infestation.*—Of the 26 men employed in the first group of experiments 20 were exposed in this manner to lice that had bitten trench fever cases in the febrile stages of the disease, while four others were exposed for the same or a longer period of time to normal, uninfected lice which had only fed upon healthy individuals. After a period of over three months, in order to show whether the men who had been exposed to the normal lice were or were not naturally immune to trench fever, three of them were subsequently exposed by other methods to trench fever infection. All of them contracted the disease. Of the 20 men in the first group and six in the second group who were exposed to lice that had fed upon cases of trench fever, 20, or 76 per cent., developed this disease. On the other hand, the two exposed to many hundred lice newly hatched from eggs laid by lice which had fed on trench fever cases did not contract the disease. Thus no evidence was obtained of hereditary transmission of the virus of trench fever in the louse. In the three instances in which lice taken from the clothing of trench fever cases were employed for infection, two of the individuals exposed to such lice contracted the disease."

Experiments were also successful in showing that the louse may transmit trench fever by the bite alone through the normal skin.

In five instances lice which had not been in contact with a case of trench fever for from 48 to 60 hours were shown to be capable of causing trench fever in healthy men. The lice may transmit the disease after they have been taken away from a case of trench fever for as long a time as 13 days, which points to a multiplication of the virus, or an intermediate cycle of the organism within the louse.

The next question was whether the disease was spread in any other way than by biting. Infection may follow the rubbing into the scratched or abraded skin the crushed louse or the contents of the alimentary canal; but whether the virus is introduced in material from the salivary glands, or the cœlomic fluid or the material from the alimentary canal was not determined. Eight of the volunteers free from lice and living with and sleeping under exactly similar conditions to the other volunteers who were contracting and had contracted trench fever from the infected lice confined upon them in covered cells remained healthy, as did four other control volunteers living under the same conditions, except that normal lice were confined upon them.

Chapters VII.–XII. give full details of the blood transmission experiments, the bacteriological studies, the agglutination reactions, the lice-feeding experiments, the filterability and thermal death-point of the virus, and the infectivity of the excreta.

Clinicians will turn with interest to Chapter XIII., in which the features of the experimentally induced disease are described. This part of the work has been prepared in great detail, and the full reports, with temperature charts, of 80 cases are given, two of which are reproduced in the note at the end of this article. Practically the artificially and naturally acquired disease present the same features, now too well known to describe again; but one or two points may be emphasised. Nystagmus was found in 85 per cent. of the patients, associated, it is thought, with the general muscular weakness and not a specific feature. A macular rash was present in a majority of the cases, chiefly on the chest and abdomen, and the spots may recur with each "spiky" relapse. This percentage of cases, a rash 50 to 70, is much higher than we have seen in the relapses in this country. The spleen was enlarged in 85 per cent. Shin pains and tenderness were not so common or so severe in the artificially induced disease. The effort syndrome, so marked a sequel of the natural disease, was not met with.

V.—*Conclusions of the Commission.*

The following conclusions were reached by the Commission:—

"1. That trench fever is a specific, infectious disease; that it is not a modified form of typhoid or paratyphoid fever, and is not related, from an etiological standpoint, to these diseases.

2. That the organism causing the disease is a resistant filterable virus.

3. That the virus causing trench fever is present particularly in the plasma of the blood of trench fever cases, and that such plasma will produce the disease on inoculation into healthy individuals.

4. That the disease is transmitted naturally by the louse *Pediculus humanus*, Linn., var. *corporis*, and that this is the important and common means of transmission; that the louse may transmit the disease by its bite alone, the usual manner of infection, or the disease may be produced artificially by scarifying the skin and rubbing in a small amount of the infected louse excrement.

5. That a man may be entirely free from lice at the time he develops trench fever, the louse that infected him having left him some time previously as its host, and that the louse need only remain upon the individual for a short period of time in order to infect him.

6. That the virus of trench fever is also sometimes present in the urine of trench fever cases, and occasionally in the sputum and that the disease may be produced in man by the introduction of the virus in the urine or sputum through the scarified or otherwise abraded skin.

7. That since the urine and sometimes the sputum of trench fever patients are infective, these should be sterilised in order to avoid the possibility of accidental infection from them.

8. That in order to prevent trench fever or limit its spread, and thus save man-power for the armies, greater efforts must be made to keep soldiers in general from infestation with lice.

On account of the great importance of the matter the following sanitary regulations are advised: Exceedingly great care should be taken to completely disinfest all patients as soon as practicable, and particularly upon their entering the hospital. Patients on entrance should be carefully bathed, and subsequently sponged with alcohol. Their clothing and blankets should be removed, and, whether or not lice or ova are found upon them, should be carefully sterilised by moist heat at a temperature not below 70° Centigrade for half an hour, since it is possible for the virus to be still present on the clothing. It should be borne in mind that a man with trench fever may be entirely free from lice at the time that he develops symptoms of the disease. Trench fever patients should at all times be carefully protected from louse infestation, and inspection of them for lice should be made daily. They should be treated in separate wards. As the urine contains the virus and is infective it should be sterilised during the active stages of the disease. Sputum cups should be provided for patients, and any excoctorated sputum and saliva from them sterilised. Officers should regard the systematic destruction of lice as one of the most urgent of their duties, and should exercise every effort to prevent louse infestation among soldiers and to see that any of them infested with lice are promptly disinfested and their clothing sterilised."

Remarks.

One of the shocks of the great war has been that lousiness and the itch have had such an innings. We had become clean enough, at least in this country and America, to forget the enormous capabilities of the louse. The fate of armies has been decided through the devastations of diseases transmitted through it. The truth is that the "sparrow hawks of Montagu College," as Rabelais called lice, have always been terrible pests. In a MS. note-book of John Locke is a memorandum of the placards on the walls of streets of Paris giving directions against the prevailing lousiness. Many persons have a curious tolerance of their presence. An Austrian soldier under my care at the Johns Hopkins Hospital assured us that he was never in the best of health unless he was verminous. There is a famous seventeenth-century tractate, *Laus pediculi* (addressed Ad Conscriptores Mendicorum Patres), which begins: "Sacrum morbum esse opinionem vere positer ac eliganter Patres Mendicorum, ab antiquis proditum memoriæ est." The idea of harmlessness was widespread, and is expressed in the Beggar's Song in Izaak Walton's "Compleat Angler":—

> A hundred herds of black and white
> Upon our gowns securely feed,
> And yet if any dare us bite,
> He dies therefore as sure as creed.

Burns puts a truer feeling in his famous poem "To a Louse"—

> Ye ugly, creepin', blastit wonner,
> Detested, shunn'd by saunt an' sinner.

The reports of the English and American Commissions should help enforce effective regulations—not in warfare always easy to carry out—against the "crowlin ferlie's" that have done so much damage.

In supplementing in this way the work of the Army the American Red Cross has done a splendid service. The report is a good illustration of the value of team-work. Without the active coöperation of all the members, so laborious an undertaking could not have been accomplished in so short a time. We may join heartily in the thanks which the Commission offers to the men who endured so patiently the many trials of the experiment. To Major Strong and his able colleagues we may offer our warmest congratulations; and our thanks are due to Mr. Frederick Hall, of the Clarendon Press, for the prompt production of a beautiful volume.

AMERICAN RED CROSS REPORT ON TRENCH FEVER.

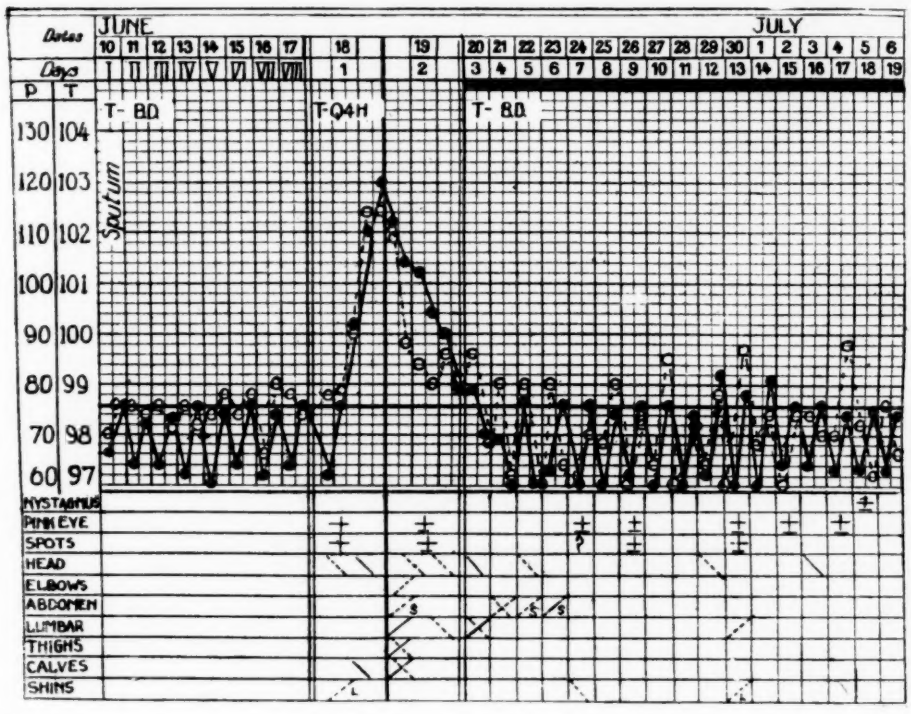
SAMPLE CASE REPORTS (WITH CHARTS).

Out of the 80 case reports presented in detail in the volume under notice we have selected for reproduction two which are fairly typical of the research as a whole, giving in the first only the actual notes of the case.

Key to Charts.

The temperature is indicated by solid dots and continuous line; the pulse-rate by circles and broken line; spleen palpable by the black stripe at the top of the chart; nystagmus, pink eye, and spots by a + or ± in the respective file. Under the various regions of the body a sloping line \ indicates pain, / tenderness, and X both, dots showing less severity. T = temperature. B.D. = twice a day. Q4H = every four hours. P.X. = physical examination.

CHART 1.



(For Key to Charts see previous column.)

Fig. 1 is the chart of a sergeant in the American Expeditionary Force who voluntarily submitted to inoculation with trench-fever-infected material. On Feb. 25th he was injected intravenously with filtered plasma from a well-marked case of trench fever in a man of 21 on the second day. He was then under observation until June 10th without evidence of trench fever. On June 10th his arm was scarified, and combined dried sputum sediment from four cases of trench fever was rubbed in. The result is summarised as follows:—

Local reaction slight. Incubation period, eight days. Prodromata: none. Onset sudden, with dizziness and pain on rotation of eyes. Course: Initial two-day bout of fever, with pains and corresponding tenderness. Very slight cough and a few râles accompanied this. On the ninth day a small crop of spots; no fever or symptoms. On the twelfth day, headache and fever of 99·2° F. On the thirteenth day, a small crop of spots. On the fifteenth day, fever of 99·1° F. and slight lumbar and shin tenderness. Spleen continuously palpable from third to nineteenth day. A mild course. NOTES.—*June 10th:* Arm scarified and dried sputum sediment rubbed in. *June 18th*, 7 P.M.: At 2 P.M. began to feel dizzy. Dizziness intermittently during the afternoon. No headache. Pain on rotation of eyes. Slight soreness of muscles above crest of ilium. Does not feel sick, but nevertheless does not feel entirely well. No sore throat. Very occasional dry cough. No appetite for supper. Has felt chilly for past hour (has been in bed). P.X.: Pink eye +. Nystagmus 0 (pain on deviation of eyes). Tongue: Slight furry brown coat. Lungs clear. Abdomen negative. Spots +. Spleen 0. Slight tenderness left shin. Looks toxic. *June 19th:* During night felt chilly. Did not sleep well on account of headache. No appetite for breakfast. Slight pains in thighs and calves. Still looks toxic. Tenderness as charted. The spots have practically disappeared. Musical râles throughout both lungs. *June 20th:* Much better this morning; cough almost gone, never marked. Lungs are clear. It would appear that the mild respiratory symptoms are simply a part of the general picture. The spleen is easily palpable this morning. The condition looks like trench fever. *June 26th:* Since last note has felt quite well. With the character of the first bout of fever a relapse might be expected if the condition is trench fever. The spleen is still distinctly palpable, and this morning a few spots appeared. *June 27th:* Feels quite well. The spots, which were quite distinct yesterday morning, had disappeared at 5 P.M. There are none this morning. *June 30th:* Yesterday evening had "tired" feeling in calves and shins, not amounting to pain. Headache. Appetite poor. This morning feels well. P.X.: A few spots. Spleen persists. Tenderness: Lumbar and left shin, slight. *July 1st:* Feels well. Spots gone. *July 2nd:* Slight fever last night, unaccompanied by symptoms except a "tired" feeling in back of neck. *July 4th:* Headache last night. *July 7th:* Spleen not palpable to-day. *July 18th:* Has felt well since last note. Now up all day. P.X. negative.

CHART 2.

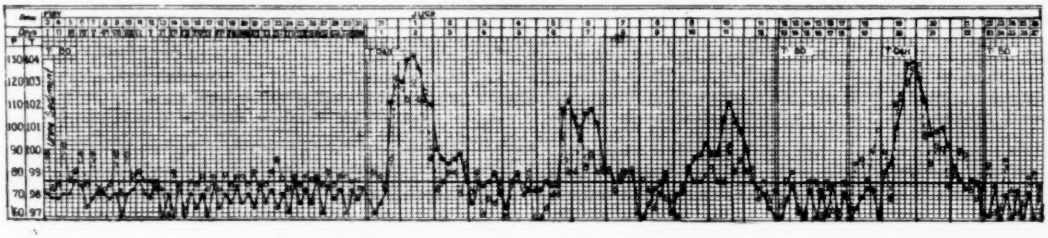


Fig. 2 is the chart of a private soldier, aged 20, inoculated with urine sediment from another experimental case of trench fever, and therefore at second remove from the spontaneous disease. The summary is as follows:—

May 3rd: Arm scarified and urine sediment from No. 30 (collected on second day of disease) applied. *May 13th:* Repeated with urine of the eighth, tenth, eleventh, and twelfth days of the same case. No. 30 had contracted the disease following similar urine sediment inoculation. Incubation period 28 or 18 days. Prodromata: Slight headache the day of onset. Onset sudden, with a chill, followed by severe headache. Course: Four two-day cycles of fever, the peaks of the first three separated by four-day intervals, while the last one occurred nine days after the third, as though one relapse had been skipped. All were marked by severe prostration, but by a dearth of pain and tenderness.

SOME CONSIDERATIONS OF THE TUBERCULOSIS PROBLEM:

REPORT OF THE TUBERCULOSIS DEPARTMENT, ST. THOMAS'S HOSPITAL.

BY R. C. WINGFIELD, B.A., M.B., B.CH. OXON., M.R.C.P.,

MEDICAL OFFICER IN CHARGE OF THE TUBERCULOSIS DEPARTMENT, ST. THOMAS'S HOSPITAL.

THE work of the Tuberculosis Department of St. Thomas's Hospital, with which is incorporated the Borough Tuberculosis Dispensary for the Inner Wards of Lambeth, has been carried on as usual during 1917. On the medical or therapeutic side of the work there is little that calls for special comment. The figures in the appended tables show the number and type of cases dealt with and the sources from which they came. On the social side things have been different. Adequate after-care and home treatment have been hindered by the increasing difficulty in obtaining suitable food and by the decreasing purchasing value of the sovereign. The worries, uncertainties, and sorrows attendant on the war have also made treatment difficult in many individual cases. The supply of hospital and sanatorium beds has not developed during the last four years, as it probably would have done had we been at peace, and at the present time there are definitely not sufficient of either class of bed. This has entailed long waiting lists, and the patients have suffered both physically and mentally. It has been felt by all types of cases, but perhaps more by the adult surgical tuberculosis case than any other.

The Working of the Tuberculosis Scheme.

I should like, however, after five years' experience as medical officer of this department, to offer a few considerations on some points of the working of the tuberculosis scheme. The scheme is that in each district practitioners shall treat their panel and private patients for tuberculosis, and that in the district there shall be a tuberculosis dispensary with its tuberculosis officer, whose services they can demand, for help in diagnosis and advice and help in the treatment of these cases. That this tuberculosis officer shall supervise the treatment and that the practitioner and the tuberculosis officer shall coöperate in this work. This scheme does not, and cannot, work satisfactorily. The reasons are many, but I intend to deal with only two.

First, the general practitioner cannot treat his cases of tuberculosis. Second, he and the tuberculosis officer do not (and perhaps cannot) satisfactorily coöperate. This looks, at first sight, like a vicious attack on the general practitioner, but it is not so, as I hope to be able to show.

To take the first point: The satisfactory treatment of tuberculosis needs expert medical knowledge, and also expert knowledge of what I may call "social work among the working classes," and very few people in England have this double expert knowledge—certainly not the overworked general practitioner—and had he got it, the tremendous amount of pure medical work which he has to get through in the 24 hours would prevent him from using his knowledge of "social work" on any but a very few of his cases. After-care and home treatment of tuberculosis depend entirely on the use of this knowledge of "social work" under medical supervision, it has its own technique and is a fine art in itself, which can only be acquired after a lengthy and somewhat laborious training under skilled teachers at certain recognised centres; and medical treatment of tuberculosis without "after-care" and "home treatment" is useless. We have now in every district a Tuberculosis Care Committee to meet this difficulty, but it does not meet it. The success of this side of the treatment of tuberculosis depends on the personality of the social worker and the very close coöperation between the doctor and the social worker. A Care Committee has no personality, or, if any, rather an unpleasant one. The Care Committee meets once a week or once a fortnight, and the whole aspect of a difficult case may have changed once or twice during that time; it never sees the general practitioner, and only very occasionally communicates with him, this is not close coöperation. Hence my contention that the general practitioner cannot treat his cases of tuberculosis

As to the second point—viz., that the practitioner and the tuberculosis officer do not coöperate—coöperation requires a certain amount of mutual understanding and trust, the two coöperators must get into touch with one another. This getting into touch with the practitioners in a district is a difficult problem which I will enlarge on later. To make the scheme successful there must be coöperation in treatment and coöperation in diagnosis. Coöperation in treatment is well-nigh impossible. There is often more than one correct procedure in treating any specified case of tuberculosis, and when the two coöperators are at variance, which will give way, the young tuberculosis officer, secure with his few years' special experience, or the seasoned practitioner equally secure with his many years' general experience? Probably neither, and the patient will suffer. Two doctors cannot simultaneously treat the same case. Coöperation in diagnosis is easier and more valuable, as it is by this means that we can get hold of the early and curable cases. And here is my only criticism of the practitioners: they do not use or coöperate with the dispensary as they might in this direction—at any rate in this district. I will give figures to support this.

In 1917 panel and private practitioners sent 268 cases to the dispensary. Of these, 88 were sent by one practitioner and 180 by all the rest; that is, one, whom we will call Dr. X, sent 32·8 per cent. of the total. These figures may be further analysed thus:—

	Sent by Dr. X.	Sent by all other practitioners.
1. Advanced cases of tuberculosis ...	4 = 4·6%	33 = 18·3%
2. Moderately advanced and early cases, all amenable to treatment	22 = 25·0%	72 = 40·0%
3. Doubtful cases	23 = 25·0%	48 = 26·6%
4. Apparently non-tubercular	39 = 44·3%	27 = 15·0%

Now since Dr. X sent 44·3 per cent. of doubtfuls, diagnosed finally as non-tubercular, and only 4·6 per cent. hopelessly advanced cases, as against 15 per cent. and 18·3 per cent. of all the other practitioners, it is probable that of the panel and private patients who consulted him during 1917 Dr. X, making full and proper use of the tuberculosis dispensary, missed or failed to adequately deal with very few treatable cases of tuberculosis—and if he did, seeing the high percentage of "doubtfuls" and "apparently non-tuberculars" sent by him, the onus rests very properly with the tuberculosis officer.

Suggested Modifications of Tuberculosis Scheme.

So much for destructive criticism of the tuberculosis scheme as it stands to-day; I should like to add a few points of a constructive nature.

1. *That the tuberculosis officer should be given certain facilities (to be enumerated below) and be held responsible for the health of his district as regards tuberculosis.*—By this means his work could be judged by his results, and it would provide more incentive to thorough work and scope for personal initiative than is at present experienced by this full-time public official, who in his present position feels that he is unable to do more than nibble at the edge of a large area of useful work that is waiting to be done, a position so disheartening that sustained and conscientious effort is very difficult.

2. *To have all cases of tuberculosis in the district notified direct to him.*—This innovation would allow him to gauge the extent of his work accurately and enable him to outline his plan of campaign. Further, it would give him the opportunity of getting into touch with all the practitioners of his district, gain their trust and their support, and bring about the coöperation which is essential if the problem is to be handled at all along the present lines.

3. *To have at his absolute disposal a certain fixed and adequate number of hospital, sanatorium, and advanced home beds.*—Knowledge of the resources at his disposal is an essential in the conduct of this work. Our governing bodies have it, but they can never tell how many cases they may have to deal with—their scope is too large. Had he their facilities the tuberculosis officer could make the best use of these beds and their value to his district would tremendously increase. At present he does not know how many or what type of case he may have to deal with, nor what, if any, beds he will have for their treatment.

4. *To have attached to his dispensary a whole-time social worker with an adequate staff.*—The working man who has once completely gone down with tuberculosis can seldom if

ever be got back to and kept at suitable work without help. This applies especially to the town-dweller, and here the social worker, coöperating with, and under the guidance of, the tuberculosis officer is absolutely necessary. Such work needs: (*a*) The personal factor. Sympathy, discipline, and leadership. (*b*) Thorough knowledge and training in the work. (*c*) Money. State aid for after-care would be money well spent and would save many beds at institutions in the long run. As in the case of the facilities of the tuberculosis officer this money should be fixed and adequate, and completely under the control of the social worker.

This work cannot be properly done by an after-care committee any more than the medical side could be done by a committee of doctors. A typical case, one of many, will help to emphasise this point.

In March, 1914, a man, aged 33, attended the tuberculosis dispensary of the hospital on the advice of his panel doctor. He was found to be suffering from phthisis, and sanatorium treatment was recommended. His former employment had been that of a machine-hand in a mill, a very unsuitable and dusty occupation. The family consisted of a wife and child aged 11. When her husband ceased to be a wage-earner, the wife had gone to work, but as she was only able to earn about 12*s.* a week and her food, it was necessary that some help should be given to the family. Through the coöperation of the lady almoner's department with the local office of the Charity Organisation Society this was done, and finally the patient went to a sanatorium under the National Insurance Act in May of 1914 and was discharged in October of the same year fit for light work only. Financial help was given from the sources already alluded to until the patient got a job as auxiliary postman for a few weeks at Christmastime. This was followed in January, 1915, by a post as timekeeper in a small restaurant. In April, 1915, the patient again broke down and had to give up his work, and assistance for the family was arranged by the Social Service Department for many months. Towards the end of the year he had another bad turn and was admitted to hospital. Until September, 1916, he was unable to work and constantly in receipt of assistance. In September, 1916, a very light job was found for him, which he still holds. His duties are light, and offer the very great advantage of enabling him to work practically in the open air. Although there is a considerable amount of disease in the lung there is no reason to anticipate that he cannot keep his present occupation for an indefinite period. This case may be tabulated thus:—

March, 1914-Dec., 1914—9 mths. Ill. Help needed.
Dec., 1914-April, 1915—4 mths. At work. No help needed.
April, 1915-Sept., 1916—16 mths. Ill. Help needed.
Sept., 1916-present—20 mths. Well. At work; permanent conditions.

Remembering that this case is that of a self-respecting working man, it will be readily granted that he could not have been tided over these 25 months of illness without the personal encouragement, sympathy, and conscientious endeavour of a whole-time social worker.

5. *The tuberculosis officer to actually treat all cases should they so desire, and to coöperate with the practitioner, if possible, in the treatment of those who did not wish for dispensary treatment.*—The necessity for the tuberculosis officer to do the actual treatment at the dispensary is my great point. He has the social worker behind him and he should, if properly qualified, know best how to treat the disease. It saves work and frees the practitioner for his other important duties and prevents the evils of coöperative treatment and overlapping.

These are a few points which I think would help to improve our present tuberculosis scheme. Different difficulties come to different tuberculosis officers in different districts, and I have tried here to enlarge upon some of mine and to suggest remedies for them in bare outline.

Total Number of Cases Dealt With.

—	M.I.	M.N.I.	F.I.	F.N.I.	C.	Totals.
New	446	44	248	265	486	1489
Old	205	30	145	212	339	931
Totals	651	74	393	477	825	2420

Of these there came from Lambeth: New, 748; Old, 476. Total, 1224.

Diagnosis.

—	New.	Old	Totals
Pulm. tub.	325	300	625
Non-pulm. tub.	300	300	600
Suspect.	274	332	606
Non-tub.	590	—	591

Detail Diagnosis of New Cases.

—	Pulm. tub.	Non-pulm. tub.	Suspect.	Non-tub.
M.I.	165	39	65	177
M.N.I.	18	5	11	10
F.I.	64	48	43	93
F.N.I.	59	34	63	109
C.	19	174	92	201

M.I., males insured. M.N.I., males, non-insured. F.I., females insured. C., children.

Classification of those Suffering from Pulmonary Tuberculosis.

	—	A.	B.	C.	D.		A.	B.	C.	D.
New cases ...	In_1	3	0	75	29	Old cases ...	0	1	8	43
	In_2	5	1	17	10		9	7	10	13
	In_3	117	20	32	16		157	14	13	25

In_1, resting febrile; In_2, resting afebrile, ambulant febrile; In_3, ambulant afebrile. A, fit for work and remaining so; B, fit for work, becoming unfit; C, unfit for work, becoming fit; D, unfit for work, remaining so.

Sources of cases.—Hospital, 467; panel doctor, 184; privately, 128; recruiting office, 97; private doctor, 84; charitable society, 40; London Insurance Committee, 13; London County Council, 11; affiliated dispensaries, 45; contacts, 450.

Results of contact examination.—Pulmonary tuberculosis, 11; non-pulmonary tuberculosis, 23; suspect, 76; non-tuberculous, 335.

Number of cases sent to sanatorium 1st 1917.—Males insured, 37; males non-insured, 6; females insured, 25; females non-insured, 6; children, 36.

Attendances.—7671.

Obituary.

ROBERT DONALD KEITH, M.A., M.D. ABERD.

Dr. Robert Donald Keith, formerly principal of King Edward VII. Medical School, Singapore, died at Turriff, N.B., on Oct. 2nd, at the early age of 41, after prolonged and intense suffering borne with astonishing fortitude. Even in these troublous times, when sensations have become blunted by the daily destruction of manhood, his death will come as a genuine shock to a very wide circle of friends who found a delight in his genial personality, in his transparent honesty in all his dealings with his fellow creatures, and in his simple character. He came of a fine healthy agricultural stock and was the youngest of a large family, notable among whom is Professor Arthur Keith, the distinguished anatomist. He was educated at Aberdeen University, passing through arts and medicine with distinction. Subsequently, as Carnegie Fellow, he studied pathology and bacteriology in Leipsic, Tübingen, and the London Hospital. He had originally intended to specialise in some branch of clinical medicine, but at about the age of 30 he was elected teacher of anatomy and physiology in the Medical School at Singapore, where he spent 10 years. He soon made his presence felt, and was raised to the important positions of Principal of the Medical School, lecturer on clinical medicine, consulting physician to Tan Tock Seng's Hospital, and his opinion was widely sought by the English residents in the Straits Settlements. At the outbreak of war he became captain and officer commanding the Singapore Field Ambulance, medical officer in charge of the Military Hospital, Singapore, and actively participated in quelling the mutiny in that city in the early days of the war. There is reason to believe that overwork and devotion to duty told on a constitution which had not been robust for some years and which had been undermined by residence in the tropics. On arriving home about the end of 1916 he was seriously ill and underwent an operation, which afforded such relief that he was able to take a military appointment of importance in a large hospital for cases of shell-shock. Some months ago, however, his health completely broke down. Despite great suffering he was able to complete an excellent book on clinical case-taking which is likely to be widely appreciated by medical students. Dr. Keith is survived by his wife and three sons.

MEDICAL MAGISTRATES.—Sir Arthur William May, K.C.B., of St. Tudy, Cornwall, formerly Director-General, Medical Department, R.N., and Mr. Thomas Mitchell Bonar, M.B., C.M. Glasg., D.P.H. Bristol, of Truro, have been placed on the Commission of the Peace for the County of Cornwall.

ST. MARY'S HOSPITAL MEDICAL SCHOOL.—The following entrance scholarships have been awarded:—University Scholarship of 50 guineas: R. Y. Paton, Trinity College, Cambridge. Open Scholarships: £100, R. M. Fry, Merchant Taylors' School; £50, D. Levi, Marylebone Grammar School. Palmer Scholarship: £25, R. W. Scarff, City of London School. Epsom Scholarship: £52 10*s.*, J. A. Walker, Epsom College.

The War.

THE CASUALTY LIST.

THE following medical officers appear among the casualties announced since our last issue:—

Killed.

Major T. F. P. Breen, R.A.M.C., was educated at Stonyhurst and at Trinity College, Dublin, and qualified in 1912. After holding an appointment at the Mater Misericordiæ Hospital, Dublin, he joined the R.A.M.C., and went to France on the outbreak of war.

Major C. McN. McCormack, M.C., R.A.M.C., qualified at Belfast in 1914. The award of the M.C. was recorded in THE LANCET of Sept. 30th, 1916, p. 620.

Capt. J. T. Kirkland, M.C., R.A.M.C., qualified at Glasgow in 1909, and held appointments at the Maternity and Women's Hospital, and at the Royal Infirmary, Glasgow. The award of the M.C. was recorded in THE LANCET of Jan. 22nd, 1916, p. 215.

Lieut.-Col. F. H. Bradley, D.S.O., R.A.M.C., qualified at Edinburgh in 1906, and joined the R.A.M.C. in 1910. The award of the D.S.O. was recorded in THE LANCET of Jan. 12th, 1918, p. 78.

Died of Wounds.

Temp. Surg. F. P. Pocock, D.S.O., M.C., R.N., was a student at Westminster Hospital, and qualified in 1913. Prior to joining the Royal Navy he was in practice at Ealing. He took part in the operations against Zeebrugge and Ostend in April this year, for which he was awarded the D.S.O. (THE LANCET, August 3rd, 1918, p. 155).

Capt. G. M. Cowper, R.A.M.C., was educated at Cambridge University and at St. Bartholomew's Hospital, London, and qualified in 1914. He joined up on the outbreak of war, and was latterly attached to 35th Field Ambulance.

Lieut. W. L. Dandridge, R.A.M.C., attached 103rd Field Ambulance, qualified in November, 1917, and joined up early in the present year.

Lieut. M. J. O'Flynn, R.A.M.C., attached to the Northampton Regiment, qualified in Ireland in 1903, and held appointments at the Wolverhampton Eye Infirmary and at the Salisbury Hospital. Prior to joining up he was in practice at Neath, Glamorganshire.

Died.

Capt. J. Wood, R.A.M.C.

Wounded.

Lieut. H. A. Chodak, R.A.M.C., attached London Regt.
Lieut. F. Cameron, R.A.M.C., attached Welsh Regiment.
Major A. R. Dale, M.C., R.A.M.C.
Major C. B. Davies, M.C., R.A.M.C.
Capt. R. H. Fleming, R.A.M.C., attached R. Sussex Regt.
Capt. H. K. Ward, M.C., R.A.M.C., attd. Northampton Regt.
Capt. E. C. Bowden, R.A.M.C., attached London Regiment.
Capt. N. F. Graham, R.A.M.C., attached London Regiment.
Capt. W. H. Johnston, R.A.M.C., attached R.F.A.
Capt. D. R. Wark, Canadian A.M.C.
Capt. G. A. C. Gordon, R.A.M.C.
Capt. D. Barlow, M.C., Australian A.M.C.
Capt. R. Goulden, Canadian A.M.C.
Capt. C. L. Driscoll, R.A.M.C., attd. R. Welsh Fusiliers.
Major W. Vickers, Australian A.M.C.
Capt. J. E. Barry, Canadian A.M.C.
Capt. H. M. Cameron, Canadian A.M.C.
Lieut.-Col. A. S. Donaldson, D.S.O., Canadian A.M.C.
Capt. A. H. Veitch, Canadian A.M.C.
Capt. M. K. Acheson, M.C., R.A.M.C.
Major T. J. Kelly, M.C., R.A.M.C.
Capt. R. J. Snider, R.A.M.C.
Lieut. G. P. W. Staunton, R.A.M.C.
Capt. W. C. Morgan, Canadian A.M.C.

Injured.

Surg. J. S. L. Roberts, R.N.

Missing.

Capt. A. La B. Clark, R.A.M.C.
Capt. W. C. D. Wilson, R.A.M.C.

Previously reported Missing, now reported Prisoner in German Hands.

Major E. J. Tilbury, R.A.M.C.

THE NEW SURGEON-GENERAL, U.S.A.—Major-General Merrite W. Ireland, who has been nominated to succeed Major-General W. C. Gorgas as Surgeon-General of the United States Medical Corps, is still a young man, having been born in 1867, and is 13 years junior to his predecessor. He graduated in 1890 at Detroit College, Michigan, and in the following year at Jefferson Medical College, Philadelphia. In the early days of the war General Ireland was stationed at Fort Sam Houston, Texas.

OBITUARY OF THE WAR.

JAMES STEEL, M.B., CH.B. GLASG.,

MILITARY CROSS;
CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain Steel, who met his death in France on Sept. 2nd, at the age of 25 years, was only son of D. F. Steel, of Dennistoun, Glasgow. Educated at Whitehill School and Glasgow University, he graduated M.B., Ch.B. in 1916, during his final year acting as resident assistant at the Glasgow Eastern Hospital. On leaving the University he received a commission in the R.A.M.C. and was sent to France, where he was promoted Captain after one year's service. In March of the present year, while serving with the Royal Sussex Regiment, he was awarded the Military Cross for conspicuous gallantry and devotion to duty. The award ran:—

"This officer was one of the few regimental medical officers who were with their unit during the whole period of withdrawal. He was indefatigable in dressing the wounded, often under fire, and wherr he had to move invariably assisted himself in evacuating the worst cases. Although twice wounded himself, he refused to leave his work, except to have his wounds dressed."

A few days before his death he was transferred to the Somerset Light Infantry, and it was while marching with his regiment to the fighting line that he was killed by a shell.

An old medical friend writes: "His scholastic and University career, coupled with his attractive and engaging personality, assured him success in the profession he had chosen and loved so well."

CHARLES DEVEREUX MARSHALL, F.R.C.S. ENG.,

STAFF SURGEON, ROYAL NAVY.

WE can now supplement the bare account of Staff Surgeon C. D. Marshall which appeared in THE LANCET of Sept. 28th with a portrait of this officer taken from a group and enlarged, and with some personal details given by his friends. He was at one time sub-editor of the *Ophthalmoscope* and his own writings cover a wide field, including papers on glioma of the retina, sarooma of the uveal tract, and researches on colour vision in collaboration with Dr. F. Edridge-Green. A fleet-surgeon writes of him: "The death of Staff Surgeon Marshall will bring a feeling of bereavement to his former shipmates. I have never met any man who so completely won the esteem and affection of everyone in his ship. It was to Marshall whom we naturally turned when down on our luck. His religious convictions influenced his whole life; he was a tender-hearted doctor; he loved his life at sea; he was father and mother to every youngster on board and he had a very real influence on all who knew him. On that ghastly night following the landing at Gallipoli he heard that an attempt was to be made to evacuate the wounded from the *River Clyde*, which was at the time under musketry fire from both sides, and though he had been at work continuously for 18 hours and was quite exhausted he at once volunteered to go, and went."

GRAHAM ROBERTSON COWIE, B.M., B.CH. OXON.,

CAPTAIN, SOUTH AFRICAN MEDICAL CORPS.

Captain G. R. Cowie, who died of wounds on Sept. 3rd at the age of 27, was elder son of J. Cowie, formerly of Johannesburg. He was educated at the Lyceum, Hanover, and Loretto School, Musselburgh, going on to University College, Oxford, where he won the Welsh memorial prize in 1911, and graduated two years later. He rowed in Eights and Torpids, played Rugby football and hockey for his college, and was a member of the University Corps of King Edward's Horse. At the outbreak of war he re-enlisted in that regiment; in December, 1914, obtained a commission in the Royal Field Artillery, and went out to the Western front in May, 1915. He was mentioned in despatches for his services at the battle of Loos. Returning to England in January, 1916, to complete his medical studies at the Middlesex Hospital, he graduated last year B.M., B.Ch. Oxon., and M.R.C.S. Eng., and was given a commission in the South African Medical Corps, and returning to the Western front attached to the 1st S.A. General Hospital. At his own desire he was transferred to a South African Brigade R.G.A. as M.O., and was so engaged when he was wounded on Sept. 1st by a shell, dying of his wounds two days later. His commanding officer, writing of his loss, adds: "Captain Cowie was always loved by his patients, and anything that he could do for them was never too much trouble," and the dean of his hospital records the good influence exerted by him in everything connected with the medical school.

ALFRED ROBINSON MACMULLEN, M.R.C.S. ENG.,

SURGEON, ROYAL NAVY.

Surgeon A. R. MacMullen, who died of wounds in France on Sept. 7th at the age of 29 years, was third son of the late William F. MacMullen, of Rockcliffe, Cork. He was educated at Clifton College and Caius College, Cambridge, going on from there to the London Hospital, where he was acting as house surgeon at the outbreak of war. He volunteered at once for the Navy and served first with the Royal Naval armoured cars in German West Africa and East Africa for a period of nearly two years, during which time he was awarded the Distinguished Service Cross for conspicuous bravery in searching for and rescuing a severely wounded officer under heavy fire. In August, 1918, he was appointed surgeon to the Royal Naval Division serving in France, and had only been out one month when he was dangerously wounded on Sept. 4th and died of his wounds three days later.

Captain JOHN SIDNEY WILSON, A.A.M.C., who died of wounds on August 9th, was educated at the Church of England Grammar School, Sydney, N.S.W., and entered the medical school there in March, 1912, graduating M.B., Ch.M. four years later. As a student he took a keen interest in field sports, and had considerable success in rowing in University and college races. After qualifying he was for six months R.M.O. at the South Sydney Hospital, before joining the Australian Imperial Force in November, 1916. He was attached to various training units in the United Kingdom, and then joined a field ambulance in France, performing the duties of bearer captain from Nov. 13th, 1917, until August 9th last, when he was hit by fragments of shell while supervising the evacuation of wounded, and died from shock the same afternoon. Captain Wilson's character impressed all with whom he came in contact, and his loss is felt by every officer in the unit.

Major JOHN CLARENCE WELLS, A.A.M.C., who was killed on the same day as Captain Wilson, was educated at St. Peter's Collegiate School, Adelaide, graduating in medicine at the University two years prior to the outbreak of war. He then held the appointment of resident surgeon at the Adelaide Hospital for 18 months. In January, 1915, he enlisted in the Australian Imperial Force, serving with the 1st Australian General Hospital, and later with the 1st Light Horse Regiment as regimental M.O. in Egypt and Gallipoli. In April of the present year he was transferred to an infantry battalion as R.M.O., and served with this unit on the Somme. On the second day of the advance from Villers-Bretonneux he was wounded by a shell fragment and died on the same day. A brother officer who knew him well writes of Major Wells's studious and retiring disposition and of the fine impression made by his gallant and soldierly conduct.

CASUALTIES AMONG THE SONS OF MEDICAL MEN.

The following additional casualties among the sons of medical men are reported:—

Second Lieut. R. L. I. Arnott, Indian Infantry, killed in action, younger son of Col. J. Arnott, I.M.S., of Edinburgh and Wyselty, Dumfriesshire.

Major M. Staveley, M.C., R.F.A., died of wounds, second son of the late Mr. W. H. C. Staveley, F.R.C.S.

Major T. F. P. Breen, R.A.M.C., killed in action, elder son of the late Inspector-General T. J. Breen, R.N.

Lieut. E. G. Shepherd, Canadian Infantry, killed in action, only son of Dr. F. J. Shepherd, of Montreal, Canada.

Second Lieut. R. F. Higgs, Queen's Regiment, killed in action, youngest son of Dr. A. W. Higgs, of Chelsea, London, S.W.

Lieut. C. O'N. Daunt, South Lancashire Regiment, attached R.A.F., killed in action, younger surviving son of Dr. F. E. H. Daunt, of Clapham, London, S.W.

EXEMPTION FOR MEDICAL PRACTITIONERS.

Cases have occurred in which applications for the grant of exemption to a duly qualified medical practitioner have been made to the ordinary tribunals. As stated in the Memorandum of the Local Government Board of May 22nd last (R. 198), any such application must be made direct to the Medical Tribunal at 429, Strand, W.C. 2. Each practitioner is notified by the Ministry of National Service when his case comes under consideration by them as to the time within which an application for exemption may be made, and the application cannot be lodged until the notification has been received. A special form of application has been prepared for the use of medical practitioners which may be obtained by them from the Medical Tribunal.

AN Exhibition is being held at the Whitechapel Art Gallery illustrating women's war work. The Exhibition will be open free daily, from Wednesday, Oct. 9th, to Wednesday, Nov. 20th, from noon to 7 P.M.; Saturdays and Sundays, noon to 8 P.M.

ELSIE INGLIS LONDON MEMORIAL FUND.—Recent events in Serbia are rapidly bringing nearer the day when the Chair of Medicine in the University of Belgrade can be inaugurated in memory of Dr. Elsie Inglis's work in Serbia. The Elsie Inglis London Memorial Fund has been founded expressly to endow this Chair. On the General Committee are the names of Miss Aldrich-Blake, M.D., Dr. M. Curcin, Sir Walter Fletcher, and Sir Alfred Keogh. Of the £12,000 required over £2500 have already been promised or subscribed. Donations may be sent to the Elsie Inglis London Memorial Fund at 66, Victoria-street, London, S.W.1.

Correspondence.

"Audi alteram partem."

MEDICAL MEN IN PARLIAMENT: MEDICAL RECONSTRUCTION.

To the Editor of THE LANCET.

SIR,—There are two important points to which I should like to call attention.

Medical Men in Parliament.

(1) I am afraid that I did not make my meaning clear at the meeting at Steinway Hall on Oct. 1st,[1] and as the matter is a very important one I shall be glad if you will allow me to explain it further. The chief point which I wished to emphasise was that, whether the medical representatives in Parliament were many or few, it was most important that the profession should keep them thoroughly informed of the views of practitioners following different lines of practice and practising under different circumstances (e.g., country or town), and of the reasons for those views. In this way their representatives in Parliament would have before them the various sides of the problems, and would therefore be able to decide with some degree of certainty and unanimity, after consideration of the various points, what is the most suitable line to take when these matters come before Parliament, and what lines will most closely represent the considered experience of the various classes of practitioners.

During the year that I have been in Parliament I have only twice had views brought before me in connexion with medical subjects which were under discussion. This is not the way in which other professions or trades manage their business; there is no important subject, with the single exception of medicine, which has come before Parliament in my short experience with regard to which we have not received many reasoned letters and leaflets from the parties concerned. To keep the medical Members in Parliament fully informed as to facts and views is really as important a matter as, and possibly more important than, that of the actual number of members of the medical profession in Parliament. I hope, therefore, that during this reconstructive period men in different branches of the profession and practising in various parts of the country will come together and place their views and experience before the medical Members in Parliament in connexion with any medical subject which is under discussion.

Medical Reconstruction.

(2) The time is approaching when civilian medical men who have been serving for a long time abroad will be coming back, and it behoves those of us who have remained in England to do our best to help them out of the difficulties in which their long absence from their practices may have placed them. This matter was, I believe, discussed some considerable time ago by the British Medical Association but was dropped for a time. I think, however, that it must be taken up again without further delay. The needs of these men will be various. Some who have partners who have been keeping things together may be able to resume their practices without requiring any help and the same applies to those who have some private means. There are many others, however, who, if they are not helped to re-establish themselves, will be in very serious trouble. Such are:—

(*A*) Men without partners who have been absent for a long time and who may find that, in spite of the best services of their neighbours, their practice has more or less disappeared, at any rate for a time; but still if they can settle down again in the same place a good deal of it may return and a fresh practice may be established. But I fear that a good many of the men of this class will find it difficult to wait long enough and may require some temporary financial assistance to enable them to regain their position.

(*B*) A good many will have lost their practice altogether and will have to start afresh. Two things may be required for such men: in the first place information as to suitable places to settle in—e.g., where doctors are most needed, and in the second place temporary financial assistance.

(*C*) Men who have not previously been in practice will require advice and guidance on the same lines as *B*, but I hardly think that they have the same lien on the medical profession for financial assistance as men who have been taken away from their practices. (Incidentally it may no doubt be said with truth that it is the State who ought to help financially to reinstate the medical men whom they have taken away, but the time for action would probably have passed before any tangible result could be got in that direction.)

As to the body or bodies who might undertake this work, it seems to me that, as all the information as regards practices is already in the hands of the various war selection committees or can be most readily obtained by them, they would be the natural bodies to take up the matter of medical reconstruction. There would be no charity in what I am suggesting; no doubt, funds for expenses would need to be collected, but beyond that all that would be required would be a large guarantee fund for the loans. This fund would probably never be called on or only to a small extent, as I believe that those who received loans would look on it as their first duty to pay interest punctually and to repay the loans by instalments as soon as possible. If this suggestion is taken up, I for one, and I am sure many others, would be glad to join in forming a guarantee fund and in subscribing towards the expenses.

I am, Sir, yours faithfully,

Oct. 7th, 1918. W. WATSON CHEYNE.

[1] See report in THE LANCET of Oct. 5th (p. 465).

MEDICAL MEN IN PARLIAMENT.

To the Editor of THE LANCET.

SIR,—In accordance with the voting of those who attended the meeting of the profession at Steinway Hall on Oct. 1st, the following have been invited to serve on the committee appointed for the purpose of "taking such steps as may be possible to further the election of medical men to the House of Commons." Representatives of the Royal College of Physicians, Royal College of Surgeons, Royal Society of Medicine, Medical Department of the Royal Navy, Royal Army Medical Corps, Royal Institute of Public Health, British Dental Association, British Medical Association, Incorporated Society of Medical Officers of Health, Medical Society of London, Medico-Political Union, Medical Women's Federation, National Medical Union, Poor-law Medical Officers' Association, State Medical Service Association, the Editor of *The Lancet*, the Editor of the *British Medical Journal*, the Editor of the *Medical World*, Mr. Ernest Clarke, Dr. W. F. H. Coke (Ashford), Dr. R. A. Gibbons, Dr. Wm. Hodgson (Crewe), Sir Thomas Horder, Mr. Lockhart-Mummery, Dr. Arthur Latham, Dr. R. R. W. Logan (Ashby-de-la-Zouch), Dr. J. C. Lyth (York), Dr. H. Moreland McCrae, Dr. J. A. MacDonald (Taunton), Dr. Howard Marshall (Cirencester), Sir Henry Morris, Bt., Dr. E. H. M. Stancomb (Southampton), Dr. Barbara Tchaykovsky, Mr. E. B. Turner, Dr. Jane Walker, Colonel A. S. Woodwark, C.M.G.—I am, Sir, yours faithfully,

Portland-place, W., Oct. 8th, 1918. ARTHUR LATHAM.

To the Editor of THE LANCET.

SIR,—At the meeting held on Oct. 1st I ventured to suggest that some society, which included those who are interested in the care of the insane, should be among those nominating representatives to the proposed committee. This met with a very unfavourable reception from Sir Henry Morris, the chairman, who did not appear to regard the matter at all seriously. With all due deference to him, I do not think this suggestion should be brushed aside lightly. The consideration of the welfare of the insane has been frequently before Parliament in the past, and judging from the last report of the Board of Control is likely to be shortly before it again. The questions of earlier voluntary treatment for the poor without certification, the prospect of the foundation of psychiatric clinics in association with the universities are matters of vital public importance.

The Medico-Psychological Association has a membership of about 700, numbering among them practically all who are engaged in this branch of medicine, together with many neurologists, school medical officers, and others who are interested, and should, I think, be in close relationship with those representing the profession in Parliament.

I am, Sir, yours faithfully,

M. A. COLLINS, M.D.,
Lieutenant-Colonel, R.A.M.C.

Ewell War Hospital, Epsom, Oct. 7th, 1918.

HYPNOSIS IN HYSTERIA.

To the Editor of THE LANCET.

SIR,—It is pleasing to find that Captain D. E. Core is so closely in agreement with my theoretical views. But from the standpoint of practice there seems to be justification for me to add one or two brief remarks:—

(*a*) In my form of the hypnotic method I dispel the hysterical symptoms, not by suggesting them away, but by producing "abreaction" of the emotional state which was responsible for their production. In other words, I make the patient live again through the original emotional occurrence with hallucinatory vividness. In this way I not only clear up the amnesia which is almost invariably present as a symptom in hysterical cases fresh from the firing line, but I also obtain for the patient a strong re-synthetising factor in the liberated emotion. In *every one* of the 121 cases of hysterical mutism that passed through my hands in France, this method restored the power of speech within a few minutes. Other symptoms were cleared up in the same way.

(*b*) I find as a result of practical experience of hysterical cases that the concepts "dissociation" and "repression of emotional states" are of more help in explaining both hypnosis and hysteria than the vague concept of "suggestibility." In fact, they are needed by anyone who wishes to understand the manifestations of suggestibility in concrete instances.

(*c*) Captain Core says that the rational method of cure is "the resolution of the symptoms through the patient's own consciousness." With this I entirely agree. But I find from experience that in a certain proportion of acute cases, where amnesia is present, it is essential to bring the repressed emotional experience back from the unconscious into clear consciousness if the rational method of persuasion is to produce a permanent cure. And my method of hypnosis is both an expeditious and a safe way of doing this.

(*d*) In many cases of hysteria, and in all cases of neurasthenia, the method of hypnosis can be entirely dispensed with. Close inquiry into the patient's past history, the recall of dim memories by the method of free association, and the careful explaining to the patient as to how his symptoms have originated, together with the arousal of sthenic emotions, such as an enthusiastic expectation of cure, will suffice in these cases. To sum up the whole method I have suggested the term "autognosis," since it is a thoroughgoing theoretical and practical knowledge of self which makes a psychoneurosis or a psychosis impossible.

I am, Sir, yours faithfully,

WILLIAM BROWN,
Major, R.A.M.C.

Craiglockhart War Hospital, Edinburgh, Oct. 5th, 1918.

THE PROPHYLAXIS OF VENEREAL DISEASES.

To the Editor of THE LANCET.

SIR,—Such a stirring letter as that which appeared in your columns of Oct. 5th over the signature of "M.D., F.R.C.P., F.R.S." is worthy of the hearty and prompt support of all members of the medical profession who recognise the truth urged by your correspondent that medical prophylaxis is the most potent weapon against the spread of venereal diseases. It is to be hoped that the medical profession, as well as the general public, will assist in promoting in every possible way the proposed active propaganda for staying that plague which is still infecting, disabling, and ultimately destroying more men and women in this country than at any previous time.

Much has been done, though very recently, towards compassing the definite object of preventing venereal infection rather than relying on early treatment of the contracted or suspected disease; but it is none the less true that every move in this direction has been strenuously opposed either by public denouncements or by far more effective influences brought to bear on it by other ways and means. True though it is that many medical men have spoken out very clearly on this subject, and not without a large measure of successful effect, it is equally true, as your correspondent says, that no active steps have been taken by the medical profession as a body to urge the necessity of the earliest possible preventive disinfection in the case of venereal as in all other kinds of infectious diseases. This omission to act is largely due to the fact that many of those who are best instructed and feel most strongly regarding the extent and urgency of this evil have been, and are, greatly hampered by the positions held by them in the Army and Civil Service, and, though to a less extent, in the Navy. It is within my own knowledge true that numerous officers in all these services are prevented from acting and speaking out by official restrictions alone. Nor can it be doubted that, such restrictions apart, the influence of the great body of our medical officers of health, whose leading function it is to bring medical science to bear on the prevention of infection, would have made itself powerfully felt throughout the community.

Rather than to cast any blame whatever on those who have been thus prevented from taking combined action, the occasion now once more presents itself for the medical profession, and with their guidance for the public generally, to exert themselves to the utmost in insisting that the present scientific knowledge of the prevention of venereal infection should be duly and promptly utilised in practice. Though much has been accomplished, much more effort is needed before a sufficiently great and effectual barrier can be put up against the instant mass of disease now oppressing this country, and spreading thence into other lands. Both nationally and politically the seizure of the occasion is of high practical importance.

I am, Sir, yours faithfully,

London, Oct. 6th, 1918. H. BRYAN DONKIN.

P.S.—Please allow me to say that I have no knowledge of the identity of your correspondent.

NOTIFICATION OF INDIGENOUS MALARIA.

To the Editor of THE LANCET.

SIR,—It has been obvious for some time that, owing to war conditions, cases of indigenous malaria would sooner or later occur in this country. This anticipation has now been realised. To what extent cases have arisen in other districts during the last few weeks I do not know; but last week I had the opportunity of seeing an undoubted case in a member of the civilian population in this neighbourhood. The following history was given by his medical attendant:—

A middle-aged gentleman, of active business habits, he was in excellent health until Sept. 21st, when he began to shiver soon after going to bed. He thought he was beginning an attack of influenza. In a few hours, however, it passed off, and he felt quite well until the third day when the shivering attack recurred. Briefly, he has had recurring typical malarial attacks every alternate day since. Latterly they have become more severe. Each lasts about six hours. They anticipate by a few hours. I saw him on Oct. 2nd, in the late afternoon, when his attack was coming to an end. His appearance was typical, and a blood film showed numerous parasites of benign tertian malarial fever. This patient has not been out of England since the war began. Whether he has ever been abroad in his life or not I cannot say, but he has certainly never lived in a malarial country or suffered from malaria before. He has therefore been infected in England, probably during the month of September, 1918. During that month he has made short visits to one or two large towns in various parts of the country, occasionally staying the night. It is thus uncertain whether he has received his infection there or at home.

My object in writing this letter is not merely to record this, the first indigenous case I have seen in a civilian, but to call the attention of those who control our public health affairs to the importance of making these cases notifiable as soon as possible. With the end of the war thousands of our troops will be returning from the East, many infected with malaria, and the likelihood of indigenous cases arising on a much larger scale is very great. We ought to be obtaining such information as will enable us to advise simple precautions in those areas in which they may be necessary. The first step towards this is compulsory notification.

I am, Sir, yours faithfully,

Sheffield, Oct. 8th, 1918. ARTHUR J. HALL.

CHRONIC INTESTINAL STASIS.

To the Editor of THE LANCET.

SIR,—Much evil has been laid at the door of man's supposed rise from a quadrupedal posture, and perhaps more at the door of chronic intestinal stasis. Now DR. LEONARD WILLIAMS, in THE LANCET of Oct. 5th, has declared that the first bogey is the "*causa causans*" of the second. The cause of chronic intestinal stasis, and therefore the origin of

such a multitude of human ills, is said to be found in the fact that man has departed from the "posture and gait of his quadrupedal ancestors." One would like to know what evidence can be furnished by clinicians in support of the thesis that man is descended from quadrupedal ancestors. Slowly, but surely, such a view of man's phylogeny is passing away. In the last issue of *Nature* (Oct. 3rd), Professor Giuffrida-Ruggeri himself admits that "it is evident that Hominidæ never passed through a quadrupedal stage." The clinician must abandon this much-abused solution unless he can provide some evidence in its favour far better than anything hitherto put forward by anthropologists or anatomists.

The second lesson that Dr. Leonard Williams deduces from a study of chronic intestinal stasis will not commend itself to zoologists. He tells us that our "damnable heritage of the colon would be infinitely less damnable if we treated ours" as the quadrupeds treat theirs. And he says that they treat their colons "to long periods of complete rest," and that they go "for several days without food." Some animals do these things from the necessities of their life-habit, and it will be admitted, I think, that those animals which make frequent fasts of necessity are those having the *shortest* and *simplest* colons. When an animal has a large colon it is generally a certain indication that the creature is one that spends most of its waking hours in feeding. Did we set ourselves to follow the examples of quadrupeds having large colons we should continually munch vegetable matter, and agree with Moses as to the limitation of fasts.

I am, Sir, yours faithfully,

F. WOOD-JONES,

Hunter-street, Oct. 5th, 1918. Captain, R.A.M.C.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

Fleet Surg. J. C. Ferguson placed on Retired List at own request with the rank of Deputy Surgeon-General (Retired).

Placed on Retired List: Surg.-Gen G. Welch, C.B.

To be Surgeon-General: Deputy Surg.-Gen. G. Wildey.

To be Deputy Surgeon-General: Fleet Surg. E. C. Lomas, C.B., D.S.O.

ARMY MEDICAL SERVICE.

Lieut.-Col. J. F. Martin, C.M.G., R.A.M.C., to be a temporary Deputy Assistant Director-General.

ROYAL ARMY MEDICAL CORPS.

Temp. Hon. Lieut.-Col. Sir J. Bland-Sutton (Major, R.A.M.C., T.F.) relinquishes his temporary honorary commission on re-posting.

Temp. Major J. A. Walt (Lieutenant-Colonel, R.G.A., T.F.) to be temporary Lieutenant-Colonel.

Major H. F. Snea relinquishes the acting rank of Lieutenant-Colonel on re-posting.

Capt. H. C. D. Rankin to be acting Lieutenant-Colonel whilst in command of a Medical Unit.

Capt. M. P. Leahy relinquishes the acting rank of Lieutenant-Colonel.

Lieut. (temp. Capt.) G. H. Haines to be Captain.

H. W. Doll, late temporary Captain, is granted the honorary rank of Captain.

Temporary Lieutenants to be temporary Captains: C. P. Strong, A. Mills, E. Macmillan, A. Lowndes, I. H. Lipetz, W. P. Lowe, C. H. Ripman, E. L. Holland, T. Drysdale, J. F. Allan, A. B. Waller, R. C. W. Spence, F. H. Whyte, J. T. Grierson, W. M. Thomson, C. W. Alford, T. C. Hynd, W. Bain, S. W. Green, W. Loke, G. Price, J. C. Ogilvie, F. C. Mason, J. Findlay, G. A. Crowley, W. P. Bonner, A. J. D. Cameron, R. H. Calvert, J. B. H. Beatty, S. K. Hutton, A. R. Moir, D. H. Trail, H. M. Johnston, T. F. Ryan, F. P. B. MacTavish, J. G. Lessey, J. Macnamara, J. Magner, W. Murphy, P. D. Maclean, R. W. H. Meredith, W. H. C. Patrick, H. E. Alexander, A. H. L. Thomas, S. M. Green, D. Wardrop, J. B. C. Brockwell, A. B. Fearnley, T. J. D. Quigley, G. R. Harcourt, S. E. Cathcart, T. A. Clarke, H. H. James, I. C. MacKenzie, C. Murray, S. Vosper, H. F. Powell.

G. A. Borthwick, late temporary Captain, is granted the honorary rank of Lieutenant.

Officers relinquishing their commissions: Temp. Majors C. B. Heald, F. F. Muecke; Temp. Capts. J. McIntyre, L. S. Hooper, H. P. Helsham, E. F. Thomas, J. R. Dick, W. Corbet (on account of ill-health contracted on active service and is granted the honorary rank of Captain), G. Munro (on account of ill-health and is granted the honorary rank of Captain), J. Muckart (on account of ill-health and is granted the honorary rank of Lieutenant); Temp. Lieuts. F. W. Maunsell and A. W. Musson (on account of ill-health and are granted the honorary rank of Lieutenant), J. S. Simpson.

Canadian Army Medical Corps.—Temp. Capt. (acting Major) F. C. Clarke to be temporary Major. Temp. Capt. H. C. Mersereau to be acting Major while specially employed.

SPECIAL RESERVE OF OFFICERS.

Major (Brevet Lieut.-Col.) (acting Lieut.-Col.) W. Butler relinquishes his acting rank on ceasing to be specially employed.

Capt. (acting Major) R. S. Taylor is granted the pay and allowances of his acting rank.

Capt. A. L. Flemming is restored to the establishment.

Capt. A. H. Habgood relinquishes the acting rank of Lieutenant-Colonel and reverts to the acting rank of Major (with pay and allowances of his substantive rank).

TERRITORIAL FORCE.

Major T. H. Ionides and Capt. E. R. Clarke are seconded for duty overseas.

Capt. (temp. Major) A. A. S. Skirving relinquishes his temporary rank and is restored to the establishment.

Capt. A. W. Harrington to be acting Major whilst pecially employed and remain seconded.

General List.—Capt. (acting Major) J. Dundas relinquishes his acting rank on vacating the appointment of Deputy Assistant Director of Medical Services. Capt. J. R. Menzies to be acting Major whilst specially employed. Capt. (acting Major) J. A. Bell relinquishes his acting rank on ceasing to be specially employed.

ROYAL AIR FORCE.

Medical Branch.—C. D. H. Corbett (late Captain, R.A.M.C.) is granted a temporary commission as Captain, and to be temporary Lieutenant-Colonel whilst specially employed. Major C. H. S. Taylor to be temporary Lieutenant-Colonel whilst specially employed. The undermentioned are granted temporary commissions as Lieutenants: A. Parker, G. M. Wishart, W. J. Lytle.

Dental Branch.—L. Wigoder is granted a temporary commission as Lieutenant.

URBAN VITAL STATISTICS.

(Week ended Oct. 5th, 1918.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at 16,500,000 persons, the annual rate of mortality was 12·6, against 11·7 and 11·4 per 1000 in the two preceding weeks. In London, with a population slightly exceeding 4,000,000 persons, the death-rate was 12·7, or 0·6 per 1000 above that recorded in the previous week; among the remaining towns the rates ranged from 3·0 in Smethwick, 3·5 in Gillingham, and 4·4 in Lincoln, to 21·6 in Tottenham, 23·9 in Portsmouth, and 27·3 in Exeter. The principal epidemic diseases caused 278 deaths, which corresponded to an annual rate of 0·9 per 1000, and included 186 from infantile diarrhœa, 36 from diphtheria, 22 from whooping-cough, 13 each from measles and scarlet fever, and 8 from enteric fever. The deaths from diarrhœa, which had declined from 435 to 220 in the five preceding weeks, further fell to 186, and were 92 below the number registered in the corresponding week of last year; 55 deaths belonged to London, 14 to Liverpool, 7 to Birmingham, and 6 each to West Ham, Middlesbrough, and Newcastle-on-Tyne. The 1019 cases of scarlet fever and 1125 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were 80 and 65 above the respective numbers remaining at the end of the previous week. Of the total deaths in the 96 towns 103 resulted from violence. The causes of 36 deaths were uncertified, and included 7 in London, 5 in Birmingham, and 4 each in Liverpool and Manchester.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual rate of mortality, which had increased from 10·6 to 14·3 in the three preceding weeks, further rose to 19·0 per 1000. The 559 deaths in Glasgow corresponded to an annual rate of 28·2 per 1000, and included 12 from infantile diarrhœa, 5 each from whooping-cough and diphtheria, and 1 from scarlet fever. The 88 deaths in Edinburgh were equal to a rate of 13·8 per 1000, and included a fatal case each of whooping-cough, diphtheria, and infantile diarrhœa.

Irish Towns.—The 163 deaths in Dublin corresponded to an annual rate of 21·3, or 1·3 per 1000 above that recorded in the previous week, and included 11 from infantile diarrhœa, 3 from enteric fever, 2 from diphtheria, and 1 each from scarlet fever and whooping-cough. The 72 deaths in Belfast were equal to a rate of 9·6 per 1000, and included 5 from infantile diarrhœa.

Medical News.

ROYAL COLLEGES OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—At the Second Professional Examination in Anatomy and Physiology, held on Sept. 26th, 27th, and 30th, and Oct. 1st, for which 70 candidates presented themselves, 42 were approved, and 28 were rejected. The following are the names and medical schools of the successful candidates:—

Douglas Robert Ainsworth, Manchester Univ.; George Kilpatrick Artour, St. Bart.'s Hosp.; William Beaumont, London Hosp.; Frans Bekker Guy's Hosp.; John Ryther Steer Bowker, Sydney Univ. and Middlesex Hosp.; Georgie Geddes Brown, Aberdeen Univ.; Hitchon Seater Chadwick, Manchester Univ.; Agnes Eloise Murray Curlewis, Lond. Sch. of Med. for Women; Bernard John Devine and John Roy Dow, King's Coll.; Abdallah Jacob Dowek, Manchester Univ.; Thomas Annesley Eccles, St. Bart.'s Hosp.; Richard Tudor Edwards, London Hosp.; Mathieu Ernotte, Liége and King's Coll.; Ewart William Evans, Birmingham Univ.; Charles Edmund Fenton, London Hosp.; Eric St. Clair Gainer, Middlesex Hosp.; Kate Glyn-Jones, Lond. Sch. of Med. for Women; Leslie Walton Hamp, Birmingham Univ.; Basil John Hancock, Middlesex Hosp.; Sidney Estridge Harvey, St. Thomas's Hosp.; Edward Richard Hughes, London Hosp.; Janet Hughes, King's Coll.; Francis Joselin Jauch, Middlesex Hosp.; David Ellis Jones, Cardiff Univ.; James Trevelyan Jones, Guy's Hosp.; Edmund Oliver Lewis, Cambridge Univ.; Reginald Cyril Lightwood, King's Coll.; Charles Arthur Lindup, Univ. Coll.; John Nigel Loring, St. Thomas's Hosp.; Frances Mary Margerison, King's Coll.; John Kenneth Milward and Hubert Stanley Morris, Guy's Hosp.; Thomas Dallas Overend, Oxford Univ. and Univ. Coll.; Eric Finch Peck, Liverpool Univ.; Cyril Seymour Coode Prance, St. Bart.'s Hosp.; John Jenkin Rowlands, London Hosp.; Sobhi Riskallah Simaika, St. Bart.'s Hosp.; Margaret Charlotte Scrase, Lond. Sch. of Med. for Women; Maxwell Hamilton Summers, Middlesex Hosp.; John Phillip Traylen, London Hosp.; and Charles Paul Wilson, Middlesex Hosp.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—At the First Professional Examination for the Licence in Dental Surgery, held on Oct. 4th and 5th, the following candidates were approved in the subjects indicated:—

Mechanical Dentistry.—C. G. Atkinson, Guy's Hosp.; Fanny Henrietta Bachrach and E. Drayton, Royal Dental Hosp.; E. C. George and Eveline Mary Russell, National Dental Hosp.; and Winifred Hope Thomas, A. K. Wiggins, and Catherine Mabel Williams, Royal Dental Hosp.

Dental Metallurgy.—R. D. Amm, Guy's Hosp.; C. A. Moody, Pennsylvania Univ. and Guy's Hosp.

Mechanical Dentistry and Dental Metallurgy.—C. P. Mist, Royal Dental Hosp.; and H. A. Spouse, Guy's Hosp.

Museum demonstrations will be given in the theatre of the College in Lincoln's Inn-fields by Professor Arthur Keith, Conservator of the Museum, at 5 P.M., on Fridays, Oct. 18th and 25th, and Nov. 1st. The demonstrations are open to medical students and practitioners, as well as to first-aid and ambulance students.

UNIVERSITY OF GLASGOW.—The following degrees were conferred on Oct. 7th:—

Bachelor of Medicine and Bachelor of Surgery (M.B., Ch.B.).—William James Simon Cameron, Alexander Conner Connell, James Smith McLean Gray, Janet Whyte Hepburn, Humphrey Josh Hollis, James Patrick Kilty, Elizabeth Cochrane Loudon (with commendation), Patrick McDiarmid, Mary Jessie Macdonald, Maud Elizabeth Drysdale Mackinnon, Allan Watt McKorie, Margaret Gardner McVey, John Nicol (with honours), Isaac Ladipo Oluwole, Vida Johnston Perry, Marjory Mary Scanlan, Ralph Paterson Smith (with commendation), Archibald Sutherland Strachan (with commendation), James Churchill Vaughan, Hugh Wands, and William Young.

The Brunton Memorial Prize of £10, awarded to the most distinguished graduate in medicine of the year, is on this occasion divided between John Nicol and John G. Harrower (the last-named graduated in July).

A MEETING of the National Baby Week Council will take place at the Armitage Hall, 224, Great Portland-street, London, W. (by kind permission of the National Institute for the Blind), on Tuesday next, Oct. 15th, at 2.30 P.M.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—The opening meeting of the thirty-seventh session of this society was held at the West London Hospital on Oct. 4th. The retiring President, Dr. A. J. Rice-Oxley, inducted his successor, Lieutenant-Colonel E. M. Wilson, R.A.M.C. The new President presented to Dr. Rice-Oxley the Keetley Memorial Medal, and expressed the appreciation of the society for his work during the past session. Colonel Wilson then delivered the presidential address on Ancient Physic. Beginning with trephining in the Stone Age, "to allow the escape of the evil spirit," he traced the development of medical art through the Chaldean and Egyptian epochs. Owing to the prohibition of the study of anatomy at this era clinical knowledge made far more advances than surgical methods, and a number of badly set fractures have been unearthed. Whether Egyptian surgeons removed cataracts is doubtful, although they seem to have operated for pterygium and pannus and frequently to have prescribed eye lotions and salves. The rudiments of public health are discoverable in the Mosaic Law, the connexion between mice and plague being suggested. Chinese and Indian medicine were then reviewed, Colonel Wilson mentioning the claim of the Hindus that Hippocrates derived his knowledge from India. The change from superstition to rationalism was initiated into Greek medicine by Pythagoras, who was the first to pay domiciliary visits.

THE CHADWICK LECTURES.—The first of three lectures by Dr. F. G. Crookshank, entitled the "Story of a New Disease," was given on Thursday, Oct. 10th, at the rooms of the Medical Society of London. Dr. W. H. Hamer, medical officer of health for the City of London, presided. The lecturer, after a tribute to the work and teachings of Sir Edwin Chadwick, gave a sketch of the present conception of the Heine-Medin disease, referring to the recent world-cycle of epidemics that commenced in New York in 1916, and passed to Australia, New Zealand, and Eastern Europe in 1917, reaching England and France in 1918. He then traced the synthetical process by which, since the days of Underwood (1784) and the youth of Sir Walter Scott (1773), our present views regarding epidemiology have been reached, and laid stress on the now-recognised association between many forms of encephalitis and poliomyelitis, &c., and the catarrhal epidemics. He adduced evidence to show that the affection has been present in Europe for centuries in association with similar epidemics and pandemics, and suggested that a key to its understanding might be found in Willis's notion (1661) of an "Epidemical Feavour Chiefly Infestous to the Brain and Nervous Stock." The second lecture will be given on Thursday, Oct. 17th, at 5 P.M., as announced in the Medical Diary.

UNIVERSITY OF BIRMINGHAM.—The Ingleby Lectures for 1918 will be delivered on Thursdays, Oct. 17th and 24th, at 4 o'clock, in the Anatomical Lecture Theatre, by Dr. Peter Thompson, Professor of Anatomy in the University, who has taken as his subject, "Some Problems in Embryology."

CENTRAL MIDWIVES BOARD FOR IRELAND.—The first meeting of the Board was held at the office of the Local Government Board for Ireland on Oct. 1st. The following members were present: Sir W. J. Smyly, Sir J. W. Byers, Dr. E. Coey Bigger, Professor H. Corby, Dr. H. T. Warnock, Mrs. M. Blunden, Miss Annie Michie, Miss J. H. Kelly, and Miss Genevieve O'Carroll. Dr. E. Coey Bigger was elected chairman, Sir A. J. Horne deputy chairman, and Mr. J. E. Devlin was nominated as secretary. The Board appointed a finance committee, and also a committee to draw up rules and regulations to be submitted to the next meeting.

Vacancies.

For further information refer to the advertisement columns.

Barrow-in-Furness, North Lonsdale Hospital.—Second H.S. £250.
Birmingham General Dispensary.—Res. M.O. £360.
Birmingham, Erdington Infirmary, House and Children's Homes.—First Asst. M.O. £325. Also Female Second Asst. M.O. £300
Bristol Royal Infirmary.—H.P. and H.S. £120.
Burton-on-Trent Infirmary.—H.S. £200.
Cambridge Borough Education Committee.—Asst. Sch. M.O. £400.
Central London Ophthalmic Hospital, Judd street, W.C.—H.S. £50.
Dorset County Council Education Committee.—School Dentist. £300.
Dudley, Guest Hospital and Eye Infirmary.—Asst. H.S. £120.
Dumfries and Galloway Royal Infirmary.—Asst. H.S.
Great Northern Central Hospital, Holloway-road, N.—H.S. £150.
Grimsby and District Hospital.—Res. H.S. £200.
Guy's Hospital, S.E.—Chief Clin. Asst. 1 guinea per attendance.
Huddersfield County Borough.—Female Asst. M.O.H. £400.
Jarrow Borough.—Female Sch. Med. Inspector. £350.
Leamington Spa, Warneford, Leamington, and South Warwickshire General Hospital.—Second Res. M.O. £200.
Leicester, Leicestershire County Council Education Committee.—School Dentist, £400.
Manchester, Ancoats Hospital.—H.P. £200.
Manchester Education Committee.—Two Temp. Asst. Sch. M.O. £400.
Manchester Northern Hospital for Women and Children, Park-place, Cheetham Hill-road.—H.S. £150
Margate, Royal Sea Bathing Hospital for Surgical Tuberculosis.—Surgeon. £200.
Middlesex Education Committee.—Temp. Asst. Sch. M.O. £400.
National Hospital for the Paralysed and Epileptic, Queen-square, W.C.—Res. M.O. Also Jun. H.P.
Northampton General Hospital.—Jun. H.S. £150.
Norwich, Norfolk and Norwich Hospital.—H.P., H.S., and Res. M.O. £400 each.
Nottingham General Hospital.—Female Cas H.S. £250.
Paisley, Royal Alexandra Infirmary.—Res. Phys
Roll of Honour Hospital for Children, 688, Harrow-road, W.—Female Asst. Phys.
Sheffield Royal Infirmary.—Res. S.O. £200.
Southport General Infirmary.—Hon. Oph. Surg.
Swansea Hospital.—H.S. £250.
Winchester, Hampshire County Council.—Temp. Asst. M.O.H. £400.

Births, Marriages, and Deaths.

BIRTHS.

LAWRENCE.—On Oct. 1st, at Kenley, Gravesend, the wife of Stephen M. Lawrence, M.D., B.S., of a daughter.

LINDSAY.—On Oct. 4th, at 8, Oxford-road, Southport, to Colonel C. H. Lindsay, C.M.G., D.S.O., A.M.S., and Mrs. Lindsay—a son.

MAITLAND SCOTT.—On Oct. 7th, at "Shiplake," Bournemouth, the wife of Temporary Major Maitland Scott, R.A.M.C., of a son.

PRICE.—On Oct. 8th, to Dr. and Mrs. Clifford Price, Children's Infirmary, Cleveland-street, W. 1—a daughter.

MARRIAGES.

BELLINGHAM-SMITH—KENNY.—On Sept. 23rd, at St. James, Spanish-place, W., Eric Bellingham-Smith, M.D., M.R.C.P.Lond., temporary Major, R.A.M.C., to Barbara Mary, daughter of William Charles Kenny, of Freemantle House, Southampton.

MCENTIRE—PHILLIPPS.—On Oct. 2nd, at St. Martin-in-the-Fields, Trafalgar-square, Captain S. D. G. McEntire, R.A.M.C. (S.R.), to Mary Constance, only daughter of the late Major Robert Phillipps and of Mrs. Phillipps.

DEATHS.

BINCKES.—On Sept. 28th, at Woodville House, Gravesend, Frederick William Binckes, M.R.C.S., L.R.C.P., late house surgeon, Gravesend Hospital.

BREEN.—On Sept. 18th, killed in action, Major J. F. Pennefather Breen, R.A.M.C.

KEITH.—On Oct. 2nd, at Kinnermit, Turriff, Aberdeenshire, Robert Donald Keith, M.A., M.D. Aberd., late Principal of the King Edward VII. Medical School, Singapore, aged 41.

WALMESLEY.—On Sept. 23rd, at Malta, of influenza, John Joseph Walmesley, R.A.M.C., aged 42.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Short Comments, and Answers to Correspondents.

CASES OF SOLANINE POISONING.

A CORONER'S inquiry has just been concluded at Worthing into the cause of the death of two little girls (sisters), aged 8 and 4, who died suddenly on August 11th, under somewhat unusual circumstances. The children suffered a few hours before death from sickness, headache, and diarrhœa, with high temperature. Being unable to trace any evidence of irritant poisoning three medical men were not prepared to express an opinion as to the cause of death. The contents of the stomachs were therefore submitted to Mr. Otto Hehner for analysis, who found in the case of the elder child a very minute trace—about 1/13th of a gr.—of a vegetable glucoside in a crystallised condition. He came to the conclusion that it was solanine and an alkaloid produced from it, solanidine. The contents of the other child's stomach furnished all the reactions which were yielded by the alkaloid solanidine. Almost all the plants belonging to the nightshade family contain the alkaloidal glucoside solanine, which in the body underwent decomposition into glucose and the alkaloid solanidine. Berries of "deadly nightshade," shoots of sprouting or shrivelled potatoes, Mr. Hehner said, contained as much as 7 per cent. of alkaloidal glucoside. That and the alkaloid had marked poisonous properties, and produced vomiting, diarrhœa, headache, lassitude, enfeebled pulse, and heavy breathing. Many cases of fatal results were on record. The symptoms recorded by the medical men agreed in every respect with those observed in cases of solanine poisoning. Mr. Hehner came to the conclusion that both children died from the effects of eating a poisonous substance containing solanine. They might have eaten berries of the woody nightshade, which were very plentiful in the hedges at the time; and it was an equal possibility that at dinner the children ate potatoes which might have been in a decomposed or sprouting condition. Neither solanine nor solanidine was a commercial article, and neither could be obtained by purchase by an ordinary member of the public. It was therefore certain, Mr. Hehner said, that the death of the children was quite accidental. A verdict of "Death from misadventure" was returned.

JOHN OF BURGUNDY.

SUPPLEMENTING the note on a Mediæval Medical Author in THE LANCET of Sept. 21st (p. 410), a correspondent writes: "John was probably an Englishman and was not improbably the same as Sir John Mandeville. I do not think that there were any MSS. of his treatise on the plague (i.e., the Black Death) in French. Nearly all the MSS. of this work are in English libraries (British Museum, Bodleian) and are written in English or Latin. The hypothetical connexion between John of Burgundy and Mandeville was the subject of a very interesting paper by Nicholson, the late Bodleian librarian."

EUTHANASIA.

THE August issue of *Scientia*, an international review of synthetic science published monthly at Bologna (London: Williams and Norgate), contains an article in French by Professor J. A. Lindsay, of Belfast, on the Moral Dangers of Euthanasia. He opens with the question:

En cas de maladie incurable et douloureuse, lorsque le malade demande à être délivré de l'existence et que ses amis y consentent, y a-t-il quelque bonne raison pour que le médecin ne fasse pas usage des moyens certains qu'il possède de hâter une issue inévitable, de mettre fin à des souffrances inutiles?

And after considering the answers given by the ancient Greeks and civilisations of different grades concludes that the modern reply must be:

Il semble donc que, même sans invoquer les sanctions de la religion, en se plaçant seulement au point de vue des intérêts supérieurs de la race, on doive faire une objection des plus sérieuses à l'euthanasie—et *a fortiori* au suicide et à toute forme d'infanticide; qu'elle implique des dangers moraux graves et subtils; que son adoption introduirait un élément sinistre dans la vie humaine et tendrait à l'appauvrissement moral de l'humanité.

FATAL ENTERITIS IN RABBITS.

RABBIT meat is now an important article of diet and had until recently the additional attraction of being unrationed. The fatal disease which is now carrying off young rabbits in great numbers has been shown by Dr. R. T. Leiper, who writes to the *Times* on the subject, to be due to a protozoal parasite, *Eimeria stiedæ*, which invades the gut wall and almost denudes its absorbent surface. Man is susceptible to infection, although but few cases are on record. Rabbit keepers will have to study hygienic principles both on grounds of public health as well as to ensure commercial success.

Medical Diary for the ensuing Week.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.1.

Tuesday, Oct. 15th.

GENERAL MEETING OF FELLOWS, at 5 P.M.
Installation of new President: Sir Humphry Rolleston, K.C.B., M.D.
Ballot for Election to the Fellowship. (Names already circulated.)

MEETINGS OF SECTIONS.

Wednesday, Oct. 16th.

HISTORY OF MEDICINE (Hon. Secretaries—Charles Singer, Arnold Chaplin): at 5 P.M.
Presidential Address by Mr. D'Arcy Power.
Paper: Dr. Charles Singer: From Tradition to Observation—a Chapter in the History of Anatomy (with lantern slides).

Thursday, Oct. 17th.

DERMATOLOGY (Hon. Secretary—S. E. Dore): at 5 P.M.
Cases will be shown at 4.30 P.M.
Will Members please note that no Meeting of the Section will be held in December, or in February, April, and July, 1919.

Friday, Oct. 18th.

ELECTRO-THERAPEUTICS (Hon. Secretaries—R. Knox, W. J. Turrell): at 8.30 P.M.
Presidential Address by Mr. C. R. C. Lyster.
Demonstration: Sir James Mackenzie Davidson: Stereoscopic Technique, with practical demonstration.

CLINICAL SURGERY.—These Sections are specially invited to attend this Meeting.

MEDICAL SOCIETY OF LONDON, 11, Chandos-st., Cavendish-sq., W.
MONDAY, Oct. 14th.—8 P.M., General Meeting. 8.30 P.M., Opening Address: Major A. F. Voelcker (incoming President). Demonstration:—Dr. T. B. Hyslop: Degeneration in Art, Music, Science, and Literature.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.
FRIDAY, Oct. 18th.—5 P.M., Museum Demonstration:—Prof. A. Keith: Nerve Suture and Nerve Regeneration.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
Clinics each week-day at 2 P.M., Wednesday, Friday, and Saturday also at 10 A.M.
(Details of Post-Graduate Course were given in issue of Sept. 27th.)

ROYAL INSTITUTE OF PUBLIC HEALTH, in the Lecture Hall of the Institute, 37, Russell-square, W.C.
Course of Lectures on Public Health Problems under War and After-war Conditions (each Lecture will be followed by a Discussion):—
WEDNESDAY, Oct. 16th.—4 P.M., Lecture II.:—Dr. C. W. Saleeby: Racial Reconstruction and the Proposed Ministry of Health.

CHADWICK PUBLIC LECTURES, at the Rooms of the Medical Society of London, 11, Chandos-street, Cavendish-square, W.
Lectures on the Story of a New Disease (illustrated by epidiascope):—
THURSDAY, Oct. 17th.—5 P.M., Lecture II:—Dr. F. G. Crookshank: (1) The "Nervous Feavour" of Thomas Willis; (2) Spinal Typhoid; (3) Epidemic Encephalitis.

Communications, Letters, &c., to the Editor have been received from—

A.—Major G. F. Alexander, R.A.M.C.
B.—Capt. T. C. Boat, R.A.M.C.; Surg. E. Bayley, R.N.; Dr. W. A. Bond, Lond.; Prof. W. Bulloch, Lond.; Surg. S. S. Barton, R.N.; Surg.-Gen. R. Blue, Washington; Mrs. M. Breen, Dublin; Major W. Brown, R.A.M.C.; Mr. J. Burns, Edinburgh; Mr. W. Butterly, Liverpool; Capt. G. Bate, R.A.M.C.(T.)
C.—Sir W. Watson Cheyne, Bart., K.C.M.G., C.B.; Dr. S. D. Clippingdale, Lond.; Lt.-Col. M. A. Collins, R.A.M.C.
D.—Rt. Hon. Viscount Devonport, Lond.; Mr. J. L. Dick, Lond.; Maj.-Gen. Sir Bertrand Dawson, K.C.V.O., C.B.
E.—Surg.-Gen. G. J. H. Evatt, C.B.; Major W. d'Este Emery, R.A.M.C.(T.); Elsie Inglis London Memorial Fund; Major R. C. Elmslie, R.A.M.C.
F.—*Flight*, Lond., Editor of; Dr. C. E. Flemming, Bradford-on-Avon; Mr. E. Fanshawe, Lond.
H.—Mr. W. A. P. Hill, Lond.; Major R. G. Hann, R.A.M.C.(T.); Lt.-Col. L. R. Harrison, C.A.M.C.; Major A. F. Hurst, R.A.M.C.; Dr. A. Hall, Sheffield.
I.—Incorporated Society of Trained Masseuses, Lond., Organising Sec. of; Independent Women's Social and Political Union, Lond., Sec. of; Imperial War Museum, Women's Sub-Committee, Lond.
J.—Capt. F. W. Jones, R.A.M.C.; Mr. M. H. Judge, Lond.
L.—Local Government Board and Scottish Office, Lond.; Local Government Board, Lond., Medical Officer of; Dr. A. Latham, Lond.
M.—Capt. S. A. Moore, N.Z.M.C.; Mrs. E. McLachlan, Lond.; Medical Research Committee, Lond.; Medical Society of London.
N.—National Food Reform Association, Lond.
O.—Mr. J. Offord, Lond.; Sir William Osler, Bart., Oxford.
P.—Miss K. Pilkington, Liverpool; Pharmaceutical Society of Great Britain, Lond., Sec. of.
R.—Mr. C. Round, Lond.; Royal Sanitary Institute, Lond., Sec. of; Mrs. J. D. Richardson, Lond.; Royal College of Surgeons of England, Lond., Sec. of.
S.—St. Mary's Hospital Medical School, Lond., Sec. of; Major R. P. Strong, M.R.C.; Surg. A. G. Simmins, R.N.; Major T. R. St. Johnston, R.A.M.C.; Mr. Scott, Bridgwater; Dr. E. Smith, Lond.; Dr. E. I. Spriggs, Banff; Surg. C. W. Archer, R.N.
T.—Mr. E. A. Taylor, Lond.; Dr. A. H. Thompson, Lond.
U.—University of Birmingham.
W.—Brig.-Gen. F. A. Winter, M.C., U.S.A.; Major R. B. Wild, R.A.M.C.(T.); Capt. A. H. Watson, R.A.M.C.; West London Medico-Chirurgical Society; Dr. L. A. Weatherly, Bournemouth; West London Hospital Post-Graduate College, Dean of; Dr. F. J. Waldo, Lond.

Communications relating to editorial business should be addressed exclusively to The Editor of THE LANCET, 423, Strand, London, W.C. 2.